A Level Further Formula Sheet

	Su	immation Res	ults			Vectors
Properties (3) (These work similar			$c_{k=1}^{n} c a_{k} = c \sum_{k=1}^{n} a_{k}$ $c_{k} = \sum_{k=1}^{n} a_{k} \pm \sum_{k=1}^{n} (b_{k})$		Notations Vector Form	$vector = a, \underline{a}, \overrightarrow{OA}$ distance= OA
integrals) Results (5)	 inclusiv 	e exclusive principl	$le \sum_{k=m}^{n} (a_k) = \sum_{k=1}^{n} (a_k) -$		vector rorm	$ai + bj + ck \equiv \begin{pmatrix} b \\ c \end{pmatrix}$
Results (5)	$\sum_{i=1}^{n} 1 = n$ $\sum_{i=1}^{n} n$	$\sum_{i} i^{2} \equiv \frac{n(n+1)(2n+1)}{6}$	$\sum_{i=1}^{n} c = cn$ $\sum_{i=1}^{n} i^{3} = \frac{n^{2}(n+1)}{4}$	$\sum_{i=1}^{n} i = \frac{n(n+1)}{2}$	Properties (addition/subtraction, multiplication and	$\begin{pmatrix} a \\ b \\ c \end{pmatrix} \pm \begin{pmatrix} d \\ e \\ b \end{pmatrix} = \begin{pmatrix} a \pm d \\ b \pm e \\ b \end{pmatrix} $ $\lambda \begin{pmatrix} a \\ b \\ c \end{pmatrix} = \begin{pmatrix} \lambda a \\ \lambda b \\ \lambda c \end{pmatrix}$
	Mat	rix Transforma	ations		scalar product)	$ \begin{pmatrix} c & f \\ b \end{pmatrix} \begin{pmatrix} c & f \\ e \end{pmatrix} = ad + be + cf $
Reflection in th line $y=(tan \theta)$		($\begin{pmatrix} \cos 2\theta & \sin 2\theta \\ \sin 2\theta & -\cos 2\theta \end{pmatrix}$		Magnitude of a vector	\c/\f/
Horizontal stret	tch		$\begin{pmatrix} k & 0 \\ 0 & 1 \end{pmatrix}$		Notation is	$\begin{pmatrix} b \\ c \end{pmatrix} = \sqrt{a^2 + b^2 + c^2}$
by scale factor Vertical stretch			$\begin{pmatrix} 1 & 0 \\ 0 & k \end{pmatrix}$		Unit Vector Parallel and Perpendicular to	Unit vector of $\binom{a}{b} = \frac{1}{\sqrt{a^2+b^2+c^2}} \binom{b}{b}$ Parallel means vectors are a multiple of each other
scale factor k Enlargement b					Angle Between 2 vectors	Perpendicular means scalar product equals zero
scale factor k	PY		$\binom{k}{0} \binom{0}{k}$			$\begin{pmatrix} \begin{pmatrix} a \\ b \end{pmatrix}, \begin{pmatrix} e \\ f \end{pmatrix} \end{pmatrix}$
centre (0,0) Anti-clockwise			$(\cos \theta - \sin \theta), \theta > 0$		Always use the direction vectors	$\theta = \cos^{-1} \left[\frac{\left \frac{a}{a} \right \left \frac{a}{e} \right }{\left \frac{a}{e} \right \left \frac{a}{e} \right } \right]$
rotation of ang	le		$(\sin\theta \cos\theta), \theta > 0$		Vector Equation of a line	$(\langle f \rangle) f \rangle$
θ about origin Clockwise		($\cos \theta + \sin \theta \\ \sin \theta & \cos \theta$, $\theta > 0$		To find this we need: Point and direction	$r = \begin{pmatrix} a \\ b \\ c \end{pmatrix} + \lambda \begin{pmatrix} e \\ f \end{pmatrix}$
rotation of ang θ about origin	ile	()	sin # cos # /		(if given 2 points find the directions and use either point)	$\binom{a}{b} = position, \binom{d}{f} direction (parallel to)$
		Matrices	i		Cartesian Equation of a line	$\frac{x-a}{d} = \frac{y-b}{e} = \frac{z-c}{f}$
Determinant	t 2 × 2: (a	$\begin{vmatrix} b \\ d \end{vmatrix} = ad - bc$			Parametric Form of a line Equation of a plane	$x = a + \lambda d, y = b + \lambda e, z = c + \lambda f$
	3 × 3: d d	$\begin{pmatrix} e & f \\ h & i \end{pmatrix} = a \begin{vmatrix} e \\ h \end{vmatrix}$	$\begin{bmatrix} f \\ i \end{bmatrix} - b \begin{vmatrix} d & f \\ g & i \end{vmatrix} + c \begin{vmatrix} d & e \\ g & h \end{vmatrix}$ - $f(h) - b(di - fg) + c(di - fg)$		Vector Equation of a plane	$r. n = \binom{b}{c}. n$ where n is the normal vector
Inverse	2 × 2. (a	$= a(ei - b)^{-1} - (d - d)$	-fh) $-b(di - fg) + c(di - fg)$	h – eg)	To find this we need: a point in plane and perp direction. If not	$\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} a \\ b \end{pmatrix} + \lambda \begin{pmatrix} d \\ f \end{pmatrix} + \mu \begin{pmatrix} x \\ z \end{pmatrix}$ $\begin{pmatrix} a \\ b \end{pmatrix} = position$
1			a)		given perp direction take the cross product of 2 direction vectors. Remember to find a	$\binom{d}{s}$ and $\binom{r}{s}$ = directions (parallel to)
determinan	3×3 : $\begin{pmatrix} a \\ d \\ g \end{pmatrix}$	e f			direction we subtract 2 position vectors Cartesian Equation of a plane	ax + by + cz = d
×	To find adjug	ate:	ross of corresponding row	and column for		$d = distance form origin to plane$ $\begin{pmatrix} a \\ b \end{pmatrix} = direction vector (perpendicular to)$
adjugate			ant of each remaining part		Scalar Product	(c)
, -a0		natrix of cofactors	(get the correct signs)	+ - + -	Note: θ is the angle between $\begin{pmatrix} a \\ b \end{pmatrix}$ and $\begin{pmatrix} d \\ e \end{pmatrix}$	$\begin{pmatrix} a \\ b \\ c \end{pmatrix} \cdot \begin{pmatrix} a \\ b \\ f \end{pmatrix} = \begin{pmatrix} a \\ b \\ c \end{pmatrix} \mid \begin{pmatrix} a \\ b \\ f \end{pmatrix} \cos\theta$
				+ + +	Vector Product	- 07 - 1071
	Step 3: Trans over the diag	pose all the eleme onal (the diagonal	nts. In other words swap t stays the same)	their positions	Note: θ is the angle between $\begin{pmatrix} a \\ b \end{pmatrix}$ and $\begin{pmatrix} d \\ e \end{pmatrix}$	$ \binom{a}{b} \times \binom{d}{e}_{f} = \binom{bf - ec}{-(af - cd)}_{ae - bd} $
3 types of solutions for	Consist To find	ent/unique - one si unknowns:	olution (a point)		(c) (f)	$\begin{vmatrix} a \\ b \end{vmatrix} \times \begin{pmatrix} d \\ e \end{vmatrix} = \begin{vmatrix} a \\ b \end{vmatrix} \begin{vmatrix} d \\ e \end{vmatrix} \sin \theta$
systems of line	ear Use bas	ic elimination or so ent/non-unique – i	olve $det \neq 0$ (if unknowns infinite solutions ($det = 0$)		Area of a Parallelogram	(c) (f) (c) (f)
equations	Use bas		2 pairs of the same variab	ole eliminated and	Area of a rai anciogram	$A = \begin{pmatrix} a \\ b \\ c \end{pmatrix} \times \begin{pmatrix} d \\ e \\ f \end{pmatrix}$
	 Inconsi 	get 0 = 0 stent/non unique -	no sol (det = 0)			$\binom{a}{b}$ and $\binom{d}{e}$ form 2 adjacent sides of a parallelogram
	Use bas		2 pairs of the same variab	ole eliminated and	Perp Distance between point and plane	$ a(\alpha) + b(\beta) + c(\gamma) + d $
	IOOK to	get an inconsisten Roots	Ly		from (α, β, γ) to $\alpha x + by + cz = d$ Scalar Product Properties	
Quadratics, Cubics and	Quadratic: • fo	$rm: (x - \alpha)(x - \beta)$)			(-a).b = -(a.b) $(ka).b = k(a.b)a.(b+c) = a.b + a.cIf a and b are parallel: a.b = a b , moreover a.a = a ^2$
Quartics	α	and β as the roots rm: $x^2 + bx + c$			Cross Product Properties	a × $\alpha = 0$ a × $0 = 0$ a × $0 = 0$ a = 0 $\lambda(\alpha \times b) = (\lambda \alpha) \times b = \alpha \times (\lambda b)$
	SU	m roots = -b = a oduct roots = c = a				$a \times (b + c) = (a \times b) + (a \times c)$ $a \times b = -(b \times a)$
	• fo	rm: $ax^2 + bx + c$ m: $-\frac{b}{a} = \alpha +$, pro	oduct: $\frac{c}{a} = c = \alpha \beta$			$b. (c \times a) = c. (a \times b)$ Trigonometry
	Cubic • fo	rm: $(x - \alpha)(x - \beta)$	(x-y)		If $t = \tan \frac{1}{2}$	$x \Rightarrow \sin x = \frac{2t}{1+t^2} \text{ and } \cos x = \frac{1-t^2}{1+t^2}$
	α, • fo	β and γ are the r rm: $ax^3 + bx^2 + c$	oots $cx + d = 0$		D. C. W.	Hyperbolics
			$\frac{b}{a}$, product: $\alpha\beta\gamma = -\frac{d}{a}$ roducts of pairs of roots: α	$\alpha \beta + \beta \gamma + \alpha \gamma = \frac{c}{a}$	Definitions	$sinh x = \frac{e^x - e^{-x}}{2}$ $tanh x = \frac{sinh x}{2} = \frac{e^x - e^{-x}}{2}$ $cosh x = \frac{1}{2} = \frac{2}{2}$ $csch x = \frac{1}{2} = \frac{2}{2}$
	Quartic:		$\beta(x-\gamma)(x-\delta)$, , , , , , ,		$\operatorname{sech} x = \frac{1}{\cosh x} = \frac{e^{x} + e^{-x}}{e^{x} + e^{-x}} \qquad \operatorname{coth} x = \frac{1}{\tanh x} = \frac{e^{x} - e^{-x}}{e^{x} + e^{-x}}$
	α	β , γ and δ are the	he roots		Identities	analiž u simliž u — 1 tambiž u 1 analiž u — 1
	α, • fα	β , γ and δ are the rm: $ax^4 + bx^3 + c$ im: $\alpha + \beta + \gamma + \delta$	the roots $dx^2 + dx + e = 0$ $dx = -\frac{b}{a}$, product: $\alpha\beta\gamma\delta = -\frac{b}{a}$: <u>e</u>		
	α, • fo sι sι	β , γ and δ are the rm: $ax^4 + bx^3 + c$ $ax^4 + c$	the roots $x^2 + dx + e = 0$ $\delta = -\frac{b}{a}$, product: $\alpha\beta\gamma\delta = \frac{b}{a}$ roducts of pairs of roots: $\gamma + \beta\delta + \gamma\delta = \frac{c}{a}$		Identities Inverse	$\begin{aligned} \cosh^2 x - \sinh^2 x &= 1 & \tanh^2 x + \operatorname{sech}^2 x &= 1 \\ \coth^2 x - \operatorname{csch}^2 x &= 1 & \tanh x &= \frac{\sinh x}{\operatorname{roch}} \\ \sinh 2x &= 2 \sinh x \cosh^2 x &= \cosh^2 x + \sinh^2 x \\ & \operatorname{arcosh}^2 x - \cosh^2 x &= \ln (x + \sqrt{x^2 + 1}) \\ & \operatorname{arsinh} x = \sinh^2 x &= \ln (x + \sqrt{x^2 + 1}) \end{aligned}$
	a; for st st a st y	β , γ and δ are the rm: $ax^4 + bx^3 + c$ $ax^4 + c$	the roots $dx^2 + dx + e = 0$ $dx = -\frac{b}{a}$, product: $dx = -\frac{b}{a}$ products of pairs of roots:		Inverse	$\begin{array}{ll} \cosh^2 x - \sinh^2 x = 1 & \tanh^2 x + \mathrm{sech}^2 x = 1 \\ \coth^2 x - \mathrm{csch}^2 x = 1 & \tanh x = \frac{\sinh x}{\cosh x} \\ \sinh b x = 2 \sinh x \cosh x & \cosh 2x = \cosh^2 x = \sinh^2 x + \sinh^2 x \\ ar \cosh x = \cosh^2 x = \ln (x + \sqrt{x^2 - 1}), x \ge 1 \end{array}$
$form \textstyle \sum_{i=0}^n a_i x^i$	α, fc st st α st γ	β , γ and δ are the first ax ⁴ + bx ³ + c m : α + β + γ + δ and of all possible p β + α γ + α + β and of all possible p α δ + δ α β = $-\frac{d}{a}$ Sum = $\frac{1}{a}$	he roots $x^2 + dx + e = 0$ $x^2 + dx + e = 0$ $\delta = -\frac{b}{a}, \text{product: } \alpha\beta\gamma\delta = \text{roducts of pairs of roots:}$ $\gamma + \beta\delta + \gamma\delta = \frac{c}{a}$ $\text{roducts of triples of roots:}$ $\frac{a_{a-1}}{a_a}, \text{Product} = \frac{(-1)^n a_a}{a_a}$		Inverse	$\begin{array}{ll} \cosh^+x-\sinh^+x=1 & \tanh^+x+\operatorname{sech}^+x=1 \\ \sinh^2x-\operatorname{cesh}^2x=1 & \tanh x=\frac{\sinh x}{\cosh x} \\ \sinh 2x=2\sinh x\cosh x & \cosh 2x=\cosh^+x-\sinh^+x=\frac{\cosh x}{\cosh x} \\ \arcsin^+x+\sinh^+x=\sinh^+x=\ln\left(x+\sqrt{x^2-1}\right),x\geq 1 \\ \arcsin x+\sinh x=\tanh^{-1}x==\frac{1}{2}\ln\left(\frac{x+\sqrt{x^2-1}}{\ln}\right), x <1 \\ \text{Number Theory} \\ a^a\equiv a \ (\bmod p) \ \text{if } p \ \text{is prime and } a \ \text{is any integer} \end{array}$
form $\sum_{i=0}^{n} a_i x^i$.	α, fc st st α st γ	β , γ and δ are the form: $ax^4 + bx^3 + c$ and of all possible p $\beta + \alpha \gamma + \alpha \delta + \beta$ and of all possible p $\alpha \delta + \delta \alpha \beta = -\frac{d}{a}$	he roots $x^2 + dx + e = 0$ $x^2 + dx + e = 0$ $\delta = -\frac{b}{a}, \text{product: } \alpha\beta\gamma\delta = \text{roducts of pairs of roots:}$ $\gamma + \beta\delta + \gamma\delta = \frac{c}{a}$ $\text{roducts of triples of roots:}$ $\frac{a_{a-1}}{a_a}, \text{Product} = \frac{(-1)^n a_a}{a_a}$		Inverse	$\begin{array}{ll} \cosh^{+}x-\sinh^{+}x=1 & \tanh^{+}x+\sinh^{+}x=1 \\ \coth^{+}x-\cosh^{+}x=1 & \tanh^{+}x=\frac{\sinh x}{\cosh x} \\ \sinh 2x=2\sinh x\cosh x & \cosh^{+}x=\ln (x+\sqrt{x^{2}-1}),x\geq 1 \\ arc \cosh x=\cosh^{+}x=\ln (x+\sqrt{x^{2}-1}),x\geq 1 \\ ars \sinh x=\sinh^{+}x=\frac{1}{\sinh^{+}x}=\ln (x+\sqrt{x^{2}+1}) \\ \arctan x=\tanh x=\tanh^{+}x=\frac{1}{2}\ln \left(\frac{1+x}{1+x}\right), x <1 \\ \text{Number Theory} \\ a^{+}\equiv a \ (mod \ p) \ \text{if } p \ \text{is prime and } a \ \text{is any integer} \\ \text{Mechanics} \end{array}$
	• fcc ss ss ss a a ss y y = 0	β , γ and δ are the first ax ⁴ + bx ³ + c m : α + β + γ + δ and of all possible p β + α γ + α + β and of all possible p α δ + δ α β = $-\frac{d}{a}$ Sum = $\frac{1}{a}$	he roots $\begin{array}{l} x^2 + dx + e = 0 \\ 3 = -\frac{e}{a}, \operatorname{product}: a\beta\gamma\delta = \operatorname{roducts} of \operatorname{pairs} of \operatorname{roots}: \\ \gamma + \beta\delta + \gamma\delta = \frac{e}{a} \\ \operatorname{roducts} of \operatorname{ripiles} of \operatorname{roots}: \\ \operatorname{roducts} of \operatorname{ripiles} of \operatorname{roots}: \\ \operatorname{roducts} of \operatorname{ripiles} of \operatorname{roots}: \\ \frac{a_{n-1}}{a_n}, \operatorname{Product} = \frac{(-1)^n a_n}{a_n} \\ \\ \operatorname{ES} \\ \frac{1}{2} \int r^2 d\theta \end{array}$		Inverse Fermat's Theorem	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \sinh x &= \sinh x \\ \sinh 2x &= 2 \sinh x \cosh x & \cosh 2x &= \cosh^+ x + \sinh^+ x \\ arcsh x &= \cosh^+ x + \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x &= \sinh^+ x + \sinh^+ x + \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x &= \sinh^- x + \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x &= \sinh^- x + \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ \end{aligned} $ $ \begin{aligned} \text{Number Theory} \\ a^* \equiv a (mod p) \text{if } p \text{is prime and } a \text{is any integer} \\ \end{aligned} $ $ \begin{aligned} \textbf{Mechanics} \\ \bullet &\text{Triangular Lamina: } \frac{1}{2} \text{along median from vertex} \\ \bullet &\text{Triangular Lamina: } \frac{1}{2} \text{and product of } 2^m = \frac{r}{r} \overset{\text{the form center}}{\text{form center}} \end{aligned} $
Area of sector Definition	• fcc ss ss ss ss ss sr y y = 0	β , γ and δ are the rim: $ax^4 + bx^3 + c$ $m: ax^4 + bx^3 + c$ $modeling$ for all possible p $\beta + a\gamma + ac + \beta$ $\beta + a\gamma + ac + \beta$ $\alpha + \alpha + \alpha + \beta$ Sum= Colar Coordinat Complex Number	he roots $x^2 + dx + e = 0$ $\delta = -\frac{b}{a}, \operatorname{product}: a\beta\gamma\delta = \operatorname{roducts} of \operatorname{pairs} of \operatorname{roots}: \gamma + \beta\delta + \gamma\delta = \frac{1}{a}, \operatorname{product} = \frac{(-1)^n a_0}{a_0}.$ $\frac{a_{n-1}}{a_n}, \operatorname{Product} = \frac{(-1)^n a_0}{a_n}.$ $\frac{1}{2} \int r^2 d\theta$ ers ers $\overline{-1} = i, i^2 = -1$		Inverse Fermat's Theorem	$\begin{array}{c} \cosh^+x-\sinh^+x=1 \\ \coth^+x-\cosh^+x=1 \\ \sinh x=2\sinh x\cosh x \\ \cosh 2x=\cosh^+x+\sinh^+x \\ \cosh 2x=\cosh^+x+\sinh^+x \\ \arcsin x+\sinh^+x=\sinh^+x \\ \arcsin^+x=\sinh^+x=\frac{1}{2}\ln\left(\frac{x+y^2-1}{1+y}\right), x <1 \\ \textbf{Number Theory} \\ \alpha^+\equiv\alpha\left(mod\ p\right) if\ p\ is\ prime\ and\ \alpha\ is\ any\ integer \\ \textbf{Mechanics} \\ \bullet \text{Triangular Lamina:} \frac{1}{2}\operatorname{along\ median\ from\ vertex} \\ \bullet \text{Circular\ arc,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\cos r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\cos r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\cos r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\sin r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\sin r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\sin r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\sin r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\sin r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\sin r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\sin r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\sin r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\sin r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r,\ angle\ at\ centre\ } 2\alpha=\frac{r\sin r}{\cos} \text{from\ centre} \\ \bullet \text{Sector\ of\ circle,\ radius\ r} \\ \bullet Sector\ of\ circle,\ ra$
Area of sector	• fcc ss ss ss ss ss sr y y = 0	β , γ and δ are the form and γ are the form α and γ are the form α and γ are the form of all possible p γ and γ are the form of all possible p γ and γ are the form of all possible p γ and γ are the form γ and γ are	he roots $x^2+dx+e=0$ 0 $S=-\frac{e}{a}$, $product: a\beta\gamma\delta=0$ $S=-\frac{e}{a}$, $product: a\beta\gamma\delta=0$ roots: $S=-\frac{e}{a}$		Inverse Fermat's Theorem	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \cosh 2x - \operatorname{cosh}^+ x + \sinh^+ x \\ &= \operatorname{arcoh} x = \cosh^+ x = \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ &= \operatorname{arsh} x = \sinh^+ x = \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ &= \operatorname{arsh} x = \sinh^+ x = \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ &= \operatorname{arsh} x = \sinh^- x = \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ &= \operatorname{arsh} x = \tanh^+ x = \frac{1}{2} \ln \left(\frac{1+x}{2}\right), x < 1 \\ &= \operatorname{Number Theory} \\ &= \alpha^\# \equiv \alpha (mod \ p) \ \text{if p is prime and a is any integer} \\ &= \operatorname{Mechanics} \\ &= \operatorname{Triangular Lamina}_x^2 \ \text{along median from vertex} \\ &= \operatorname{Circular arc, radius r, angle at centre $2\alpha = \frac{r-m}{x^2}$ from centre} \\ &= \operatorname{Sector of circle, radius r, angle at centre $2\alpha = \frac{r-m}{x^2}$ from centre} \\ &= \operatorname{Solid hemisphere, radius r, $\frac{1}{2}$ from centre} \end{aligned}$
Area of sector Definition Cartesian Form	α α σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ	β , γ and δ are the form and α are the form α and α are the form α and α are the form α and α are the form of all possible p α and	he roots $x^2+dx+e=0$ $\delta = -\frac{1}{2}$, $\operatorname{product:} a\beta\gamma\delta = \int_{-\frac{\pi}{2}}^{\infty} \operatorname{product:} a\beta\gamma\delta = \int_{-\frac{\pi}{2}}^{\infty} \operatorname{product:} \alpha\beta\gamma\delta = \int_{-\frac{\pi}{2}}^{\infty} \operatorname{product:} \frac{(-1)^{n}a_{n}}{a_{n}}$, $\operatorname{product:} \frac{(-1)^{n}a_{n}}{a_{n}}$. Pers $\frac{1}{2} \int r^{2} d\theta$ Pers $\frac{1}$	$a\beta\gamma + \beta\gamma\delta +$	Inverse Fermat's Theorem	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \arcsin x - \operatorname{sch}^+ x &= 1 \\ \arcsin x - \operatorname{sch}^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ \arcsin x &= \sinh^+ x = \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ \arcsin x &= \sinh^+ x = \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ \arcsin x &= \ln x + (x^2 + 1) \\ \arctan x &= 1 \\ \arctan x &= \ln (x^2 + \sqrt{x^2 - 1}), x \geq 1 \\ \arctan x &= 1 \\ - \operatorname{sch}^+ x &= 1 \\ - \operatorname$
Area of sector Definition Cartesian Form Modulus	α α σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ σ	β , γ and δ are the remark + δ γ are the remark + δ γ are the remark + δ γ and δ are the remark + δ δ δ and δ are the remark + δ δ δ and δ are the remark + δ δ δ and δ are the remark + δ δ are the remark + δ δ and δ are the remark + δ δ an	he roots $x^{2}+dx+e=0$ $\delta=-\frac{1}{2}, \operatorname{product:} a\beta\gamma\delta=\frac{1}{2}, \operatorname{product:} a\beta\gamma\delta=\frac{1}{2}$ $r+\beta\delta+\gamma\delta=\frac{1}{2}$ $r+\beta\delta+\gamma\delta=\frac{1}{2}$ $r+\beta\delta+\gamma\delta=\frac{1}{2}$ $r+\beta\delta=\frac{1}{2}$ $r+\beta\delta=\frac{1}{2$	$aeta\gamma+eta\gamma\delta+$ x number $a+bl$ in you solve for	Inverse Fermat's Theorem	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \tanh^+ x - \operatorname{sch}^+ x &= 1 \\ \tanh^+ x - \operatorname{sch}^+ x &= 1 \end{aligned} $ $ \begin{aligned} \tanh x &= \frac{\sinh x}{\cosh x} \\ &= \cosh^+ x = \ln (x + \sqrt{x^2 - 1}) . x \geq 1 \\ \operatorname{arsch} x = \operatorname{sch}^+ x = \ln (x + \sqrt{x^2 - 1}) . x \geq 1 \end{aligned} $ $ \begin{aligned} \operatorname{arsch} x &= \operatorname{sch}^+ x = \ln (x + \sqrt{x^2 - 1}) . x \geq 1 \\ \operatorname{arsth} x &= \sinh^+ x = \ln (x + \sqrt{x^2 - 1}) . x \geq 1 \end{aligned} $ $ \begin{aligned} \operatorname{arsch} x &= \operatorname{sch}^+ x = \ln (x + \sqrt{x^2 - 1}) . x \geq 1 \end{aligned} $ $ \begin{aligned} \operatorname{arsch} x &= \operatorname{sch}^+ x = \ln (x + \sqrt{x^2 - 1}) . x \geq 1 \end{aligned} $ $ \begin{aligned} \operatorname{arsch} x &= \operatorname{arsch}^+ x = \ln (x + \sqrt{x^2 - 1}) . x \geq 1 \end{aligned} $ $ \begin{aligned} \operatorname{arsch} x &= \operatorname{arsch}^+ x = \operatorname{arsch}^+ x =$
Area of sector Definition Cartesian Form Modulus	a a for the first state of the f	β , γ and δ are the matrix $\alpha^2 + b^2 + \gamma$ and $\alpha^2 + b^2 + \gamma$ and $\alpha^2 + \beta + \gamma + \delta$ and $\alpha^2 + \beta + \gamma + \alpha \delta + \gamma$ and $\alpha^2 + \gamma + \alpha \delta + \gamma + \alpha \delta + \gamma$ from of all possible p and $\alpha^2 + \delta \alpha \beta p = -\frac{\delta}{\alpha}$. Summe $-\frac{\delta}{\alpha}$ complex Number $\alpha^2 + \gamma + $	he roots $x^2+dx+e=0$ $\delta=-\frac{1}{e}, \operatorname{product}: a\beta\gamma\delta=\frac{1}{e}, \operatorname{product}: a\beta\gamma\delta=\frac{1}{e}$ $r+\beta\delta=\frac{1}{e}, \operatorname{product}=\frac{(-1)^n a_n}{a_n}$ $\frac{a_{n+1}}{a_n}\operatorname{product}=\frac{(-1)^n a_n}{a_n}$ $\frac{a_{n+1}}{a_n}\operatorname{product}=\frac{(-1)^n a_n}{a_n}$ $\frac{a_{n+1}}{a_n}\operatorname{product}=\frac{(-1)^n a_n}{a_n}$ $\frac{a_{n+1}}{a_n}\operatorname{product}=\frac{(-1)^n a_n}{a_n}$ $\frac{a_{n+1}}{a_n}\operatorname{product}=\frac{(-1)^n a_n}{a_n}$ $\frac{a_n}{a_n}\operatorname{product}=\frac{(-1)^n a_n}{a_n}\operatorname{product}=\frac{(-1)^n a_n}{a_n}$ $\frac{a_n}{a_n}\operatorname{product}=\frac{(-1)^n a_n}{a_n}\operatorname{product}=\frac{(-1)^n a_n}{a_n}produc$	$\alpha\beta\gamma+\beta\gamma\delta+$ x number $a+bi$ in you solve for r)	Inverse Fermat's Theorem	$\begin{array}{c} \cosh^+x-\sinh^+x=1\\ \coth^+x-\cosh^+x=1\\ \tanh^+x-\sinh^+x=1\\ \sinh x=2\sinh x\cosh x \qquad \cosh 2x=\cosh^+x+\sinh^+x\\ \arcsin x \qquad \cosh^+x+\sinh x=\sinh^+x\\ \arcsin x=\sinh^+x=\ln(x+\sqrt{x^2-1}),x\geq 1\\ \arcsin x=\sinh^-x=\ln(x+\sqrt{x^2-1}),x\geq 1\\ \arcsin x=\sinh^-x=1\ln(x+\sqrt{x^2-1}),x\geq 1\\ \arctan x=\sinh^-x=1\ln(\frac{x+x}{2}), x <1\\ \text{Number Theory}\\ e^x\equiv\alpha\pmod{p} \text{ if } p \text{ is prime and } \alpha \text{ is any integer}\\ \text{Mechanics}\\ \bullet \text{Triangular Lamina: } \frac{1}{2}\log m \text{ edian } f \text{ for m vertex}\\ \bullet \text{Circular } \text{arc}, \text{ radius } r, \text{ angle at centre } 2\pi \frac{r\sin x}{r\sin x} \text{ from centre}\\ \bullet \text{Sector of cricely, radius } r, \frac{1}{2}r \text{ from centre}\\ \bullet \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ above the base on the line from centre to base of vertex}\\ \bullet \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ above the base on the line from centre to base of vertex}\\ \bullet \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ above the base on the line from centre to base of vertex}\\ \bullet \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ above the base on the line from centre to base of vertex}\\ \bullet \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}\\ \cdot \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}\\ \cdot \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}\\ \cdot \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}\\ \cdot \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}\\ \cdot \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}\\ \cdot \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}\\ \cdot \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}\\ \cdot \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}\\ \cdot \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}\\ \cdot \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}\\ \cdot \text{Solid cone or pyramid of height } h: \frac{1}{2}h \text{ from vertex}$
Area of sector Definition Cartesian Form Modulus	a a for the first state of the f	β , γ and δ are the matter α ,	he roots $x^2+dx+e=0$ $\delta=-\frac{1}{2}, \text{product: } a\beta\gamma\delta=\frac{1}{2}, \text{product: } a\beta\gamma\delta=\frac{1}{2}$ $\gamma=\frac{1}{2}, \text{product: } a\beta\gamma\delta=\frac{1}{2}$ roducts of triples of roots: $\gamma+\beta\delta+\gamma\delta=\frac{1}{2}, \text{product: } \frac{(-1)^{2}n_{\alpha}}{n_{\alpha}}$ $\frac{n_{\alpha}-1}{n_{\alpha}}, \text{product: } \frac{(-1)^{2}n_{\alpha}}{n_{\alpha}}$ $\frac{n_{\alpha}-1}{n_{\alpha}}$ Product $\frac{(-1)^{2}n_{\alpha}}{n_{\alpha}}$ $\frac{1}{2}\int r^{2}d\theta$ ers $\frac{1}{2}\int r^$	$aB\gamma + B\gamma\delta +$ x number $a+bi$ in you solve for b	Fermat's Theorem Centres Of Mass For Uniform Bodies	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \sinh x - \sinh x - \cosh x \end{aligned} $
Area of sector Definition Cartesian Form Modulus	a a for the first state of the f	β , γ and δ are the matter α ,	he roots $x^{n}+dx+e=0$ $\delta=-\frac{1}{2}, \operatorname{product:}a\beta\gamma\delta=\frac{1}{2} \operatorname{product:}a\gamma\delta$ and and where the complete has positive x axis (like whe member that $-\pi \leq \theta < \pi$ get $\theta : \theta $	$\alpha\beta\gamma+\beta\gamma\delta+$ x number $a+bi$ in you solve for t t	Inverse Fermat's Theorem	$\begin{array}{c} \cosh^+x-\sinh^+x=1\\ \coth^+x+\operatorname{sch}^+x=1\\ \sinh x-\sinh x-\cosh x\\ = 1\\ \sinh x-\cosh x-\cosh^+x-\ln(x+\sqrt{x^2-1}),x\geq 1\\ \arcsin x+\sinh x-\sinh x-\sinh x-\ln(x+\sqrt{x^2-1}),x\geq 1\\ \arcsin x+\sinh x=\sinh^+x=\frac{1}{2}\ln(\frac{x+\alpha}{x^2}), x <1\\ \text{Number Theory}\\ \frac{\alpha''\equiv\alpha(mod\ p)\ if\ p\ is\ prime\ and\ a\ is\ any\ integer\\ \hline \textit{Mechanics}\\ \hline\\ \bullet \text{Triangular Lamina;}\ \frac{1}{2}\operatorname{along\ median\ from\ vertex}\\ \cdot \text{Circular\ arc,\ radius\ }r,\ ngle\ a\ t\ centr\ 2\alpha=\frac{r\sin\alpha}{x\alpha} from\ centre\\ \cdot \text{Sector\ of\ circle,\ radius\ }r,\ ngle\ a\ t\ centre\ 2\alpha=\frac{r\sin\alpha}{x\alpha} from\ centre\\ \cdot \text{Sector\ of\ circle,\ radius\ }r,\ ngle\ a\ t\ centre\ 2\alpha=\frac{r\sin\alpha}{x\alpha} from\ centre\\ \cdot \text{Setor\ of\ circle,\ radius\ }r,\ ngle\ a\ t\ centre\ 2\alpha=\frac{r\sin\alpha}{x\alpha} from\ centre\\ \cdot \text{Solid\ cone\ or\ py-amid\ of\ height\ }h:\ \frac{1}{r},\ h\ a\ b\ o\ t\ h\ b\ a\ s\ o\ t\ h\ line\ from\ centre\ t\ o\ b\ a\ vertex\\ \cdot \text{Solid\ cone\ or\ py-amid\ of\ height\ }h:\ \frac{1}{r},\ h\ a\ b\ o\ t\ h\ b\ a\ s\ o\ t\ h\ line\ from\ centre\ t\ o\ b\ a\ e\ vertex\\ \cdot \text{Solid\ cone\ or\ py-amid\ of\ height\ }h:\ \frac{1}{r},\ h\ a\ b\ o\ t\ h\ b\ a\ s\ o\ t\ h\ line\ from\ centre\ t\ o\ b\ a\ e\ vertex\\ \cdot \text{Solid\ cone\ or\ py-amid\ of\ height\ }h:\ \frac{1}{r},\ h\ a\ b\ o\ t\ h\ b\ a\ s\ o\ t\ h\ line\ f\ f\ b\ a\ b\ s\ e\ t\ b\ a\ s\ o\ t\ h\ line\ f\ b\ b\ a\ s\ o\ t\ h\ b\ a\ b\ a\ b\ b\ b\ b\ b\ b\ b\ b\ a\ b\ b\$
Area of sector Definition Cartesian Form Modulus Argument Form	a a for the first state of the f	β , γ and δ are it m : α^{+} b , γ^{-}	he roots $x^2+dx+e=0$ $\delta=-\frac{1}{2}, \text{product: } a\beta\gamma\delta=\frac{1}{2}, \text{product: } a\beta\gamma\delta=\frac{1}{2}$ $\gamma+\beta\delta+\gamma\delta=\frac{1}{2}, \text{roducts} \text{ finites of roots: } \frac{a_{n+1}}{2}, \frac{a_{n+1}}{2},$	$\alpha\beta\gamma + \beta\gamma\delta +$ $x \text{ number } a + bi$ $\text{in you solve for } \tau)$	Fermat's Theorem Centres Of Mass For Uniform Bodies	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \arcsin x \\ \arcsin x - \operatorname{sch}^+ x &= 1 \\ -\operatorname{sch}^+ x &= 1 \\ -\operatorname{sch}^$
Area of sector Definition Cartesian Form Modulus Argument Form	a a for the first state of the f	β , γ and δ are it m : α^{+} b , γ^{-}	he roots $x^{2}+dx+e=0$ $\delta=-\frac{1}{2}, \text{product: } a\beta\gamma\delta=\frac{1}{2}, \text{product: } a\beta\gamma\delta=\frac{1}{2}$ $\gamma=\frac{1}{2}, \text{product: } a\beta\gamma\delta=\frac{1}{2}, \text{product: } a\beta\gamma\delta=\frac{1}{2}$	$\alpha\beta\gamma + \beta\gamma\delta +$ $x \text{ number } a + bi$ $\text{in you solve for } \tau)$	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs	$ \begin{array}{c} \cosh^+x-\sinh^+x=1 \\ \sinh^+x+ \mathrm{sch}^+x \neq 1 \\ \sinh^+x-2\sinh x \cos h x & \cosh x & \cosh 2x = \cosh^+x+\sinh^+x \\ \hline $
Area of sector Definition Cartesian Form Modulus Argument Form Eulers Form De Moivres'	a a for the following series of the following series o	β , γ and δ are the matter α ,	he roots $x^{2}+dx+e=0$ $\delta=-\frac{1}{2}, product: a\beta\gamma\delta=\frac{1}{2} product: a\beta\gamma\delta=\frac{1}{2} product: a\beta\gamma\delta=\frac{1}{2} product: a\beta\gamma\delta=\frac{1}{2} product: a\beta\gamma\delta=\frac{1}{2} product=\frac{(-1)^{n}\alpha_{0}}{\alpha_{0}}.$ Product= $\frac{(-1)^{n}\alpha_{0}}{\alpha_{0}}.$ Product= $\frac{(-1)^{n}\alpha_{0}}{\alpha_{0}}.$ Product= $\frac{(-1)^{n}\alpha_{0}}{\alpha_{0}}.$ Product= $\frac{1}{2} \int r^{2} d\theta$ Per roots: $\frac{1}{2} \int r^{2} d\theta$ Pe	$\alpha\beta\gamma + \beta\gamma\delta +$ $x \text{ number } a + bi$ $\text{in you solve for } \tau)$	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs F = Force needed to extend or compress T=tension	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \arcsin x - \operatorname{sch}^+ x &= 1 \\ \arcsin x - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ \arcsin x - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ \arcsin x - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ \arcsin x - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x &= -\operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ - \operatorname{sch}^+ x + $
Area of sector Definition Cartesian Form Modulus Argument Form Eulers Form De Moivres' Theorem Roots of z ⁿ = 1	a a c c c c c c c c c c c c c c c c c c	β , γ and δ are the γ are γ and γ are the γ and γ are the γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ and γ are γ and γ are γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ and γ are γ are γ and γ are γ and γ are γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ and γ are γ and γ are γ are γ and γ are γ are γ and γ are γ are γ are γ are γ and γ are γ are γ are γ and γ are γ are γ and γ are γ are γ and γ are γ and γ are γ are γ are γ and γ are γ are γ and γ are γ are γ are γ and γ are γ are γ and γ are γ	he roots $x^{2}+dx+e=0$ $\delta=-\frac{1}{2}, product: a\beta\gamma\delta=\frac{1}{2} product: a\beta\gamma\delta=\frac{1}{2} product: a\beta\gamma\delta=\frac{1}{2} product: a\beta\gamma\delta=\frac{1}{2} product: a\beta\gamma\delta=\frac{1}{2} product=\frac{(-1)^{n}\alpha_{0}}{\alpha_{0}}.$ Product= $\frac{(-1)^{n}\alpha_{0}}{\alpha_{0}}.$ Product= $\frac{(-1)^{n}\alpha_{0}}{\alpha_{0}}.$ Product= $\frac{(-1)^{n}\alpha_{0}}{\alpha_{0}}.$ Product= $\frac{1}{2} \int r^{2} d\theta$ Per roots: $\frac{1}{2} \int r^{2} d\theta$ Pe	$\alpha\beta\gamma + \beta\gamma\delta +$ $x \text{ number } a + bi$ $\text{in you solve for } r)$	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs F = Force needed to extend or compress Teltension x = length of extension/compression k = stiffless constant (spring constant	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh^+ x - \operatorname{sch}^+ x &= 1 \\ \arcsin^+ x - \operatorname{sch}^+ x - \operatorname{sch}^+ x - \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ \arcsin^+ x - \operatorname{sch}^+ x - \operatorname{sch}^+ x - \operatorname{sch}^+ x + \operatorname{sch}^+ x + \operatorname{sch}^+ x \\ \arcsin^+ x - \operatorname{sch}^+ x &= \ln(x + \sqrt{x^2 - 1}), x \geq 1 \\ \arcsin^+ x - \operatorname{sch}^+ x &= \ln(x + \sqrt{x^2 - 1}), x \geq 1 \\ \arcsin^+ x - \operatorname{sch}^+ x &= \ln(x + \sqrt{x^2 - 1}), x \geq 1 \\ - \operatorname{Number Theory} \\ \alpha'' \equiv \alpha (mod p) \text{ if } p \text{ is prime and } \alpha \text{ is any integer} \\ \text{Mechanics} \\ \bullet & \operatorname{Triangular Lamina}_{-x}^2 \text{ along median from vertex} \\ \bullet & \operatorname{Triangular Lamina}_{-x}^2 \text{ along median from vertex} \\ \bullet & \operatorname{Triangular Lamina}_{-x}^2 \text{ along median from vertex} \\ \bullet & \operatorname{Circular arc, radius }_{-x}^2 \text{ along median from vertex} \\ \bullet & \operatorname{Scidic cone or pyramid of height }_{-x}^2 \text{ in bove the base on the line from centre to base of vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in bove the base on the line from centre to base of vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height }_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height}_{-x}^2 \text{ in from vertex} \\ \bullet & \operatorname{Solid cone or pyramid of height}_{-x}^2 \text{ in from vertex} \\ \bullet & Solid cone or pyramid of h$
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Area of sector Definition Cartesian Form Modulus Argument Form De Moivres' Theorem Roots of z** = 1 Eigenvalues Eigenvectors	a a si si si a si si si a si	β , γ and δ are the matter α and β are the matter β are the matter β and β are the matter β are the matter β are the matter β are the matter β and β are the matter β are the matter β and β are the matter	he roots $x^{-1} + dx + e = 0$ $S = -\frac{1}{e}, \operatorname{product:} a\beta \gamma \delta = \frac{1}{e}, \operatorname{product:} a\beta \gamma \delta = \frac{1}{e}, \operatorname{product:} a\beta \gamma \delta = \frac{1}{e}$ $\gamma + \beta \delta + \gamma \delta = \frac{2}{a}$ roducts of triples of roots: $\gamma + \beta \delta + \gamma \delta = \frac{2}{a}$ rescent $\frac{1}{2} \int r^{-1} d\theta$ et s $\frac{1}{2} \int r^{-1} d\theta$ $\frac{1}{2} \int $	$a\beta\gamma + \beta\gamma\delta +$ x number $a+bl$ en you solve for t	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs F = Force needed to extend or compress T-tension x = length of extension/compression k = stiffness constant (spring constant measured in Nym 2 measured in Nym 3 measured in Newtons J = natural length of the spring Energy Note: if answer is negative then means a loss Work Done • Wework done • Wework done • F = magnitude of the force • d = distance moved IN THE DIRECTION of the force	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \sinh x \\ x - \operatorname{sch}^+ x &= 1 \end{aligned} \\ \tanh^+ x - \frac{\sinh x}{x} \\ \frac{\sinh x}{x} - \operatorname{sch}^+ x &= 1 \end{aligned} \\ \frac{\sinh x}{x} - \operatorname{sch}^+ x + \frac{\sinh^+ x}{x} - \frac{\sinh x}{x} \\ \frac{\operatorname{arcosh}}{x} + \operatorname{acosh}^+ x + \frac{\ln x}{x} + \frac{\sqrt{x^2 - 1}}{x} - \frac{1}{x} \times \frac{1}{x} + \frac{1}{x} \\ \frac{\operatorname{arcosh}}{x} + \operatorname{acosh}^+ x + \frac{1}{x} + \frac{1}{x} + \frac{1}{x} + \frac{1}{x} + \frac{1}{x} \\ \frac{\operatorname{arcosh}}{x} + \operatorname{acosh}^+ x + \frac{1}{x} + \frac{1}{$
Area of sector Definition Cartesian Form Modulus Argument Form Eulers Form De Moivres' Theorem Roots of z" = 1 Eigenvalues Eigenvectors	$\begin{array}{c} a \\ c \\$	β , γ and δ are the matter α and β are the matter α are the matter α and β are the matter α and α are the matter α are the matter α and α are the matter α are the matter α and α are the matter α an	he roots $x^{+} dx + e = 0$ $S = -\frac{1}{e}, \operatorname{product:} a\beta \gamma \delta = \frac{1}{e} \operatorname{orducts} \beta \gamma \delta = \frac{1}{e} \operatorname{product:} a\beta \gamma \delta \delta \delta = \frac{1}{e} \operatorname{product:} a\beta \gamma \delta \delta \delta \delta = \frac{1}{e} \operatorname{product:} a\beta \gamma \delta $	$a\beta\gamma+\beta\gamma\delta+$ x number $a+bl$ in you solve for b b b b c d	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs F = Force needed to extend or compress T-tension x = length of extension/compression k = stiffness constant (spring constant measured in N/m A = modulous of elasticity (spring modulus) I = natural length of the spring Energy Note: if answer is negative then means a loss Work Done • Wawork done • Wawork done • F = magnitude of the force • d = distance moved IN THE DIRECTION of the force • d = angle between the force and the displacement	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \frac{\sinh x}{x} \\ \frac{\sinh x}{x} - \operatorname{sch}^+ x &= 1 \\ \tanh^+ x - \frac{\sinh x}{x} \\ \frac{\operatorname{arcosh} x = \cosh^+ x - \ln (x + \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arstah} x - \sinh^+ x} \\ \frac{\operatorname{arcosh} x = \cosh^+ x - \ln (x + \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arstah} x - \sinh^+ x} \\ \frac{\operatorname{arcosh} x = \cosh^+ x - \ln (x + \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arstah} x - \sinh^+ x} \\ \frac{\operatorname{arcosh} x = \cosh^+ x - \ln (x + \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arstah} x - \sinh^+ x} \\ \frac{\operatorname{arcosh} x = \cosh^+ x - \ln (x + \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arstah} x - \sinh^+ x} \\ \frac{\operatorname{arcosh} x = \ln (x + \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arstah} x - \sinh^+ x} \\ \frac{\operatorname{arcosh}^+ x - \ln (x + \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arstah} x - \sinh^+ x} \\ \frac{\operatorname{arcosh}^+ x - \ln (x + \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arcosh}^+ x - \ln x} \\ \frac{\operatorname{arcosh}^+ x - \ln (x + \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arcosh}^+ x - \ln x} \\ \frac{\operatorname{arcosh}^+ x - \ln (x - \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arcosh}^+ x - \ln x} \\ \frac{\operatorname{arcosh}^+ x - \ln (x - \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arcosh}^+ x - \ln x} \\ \frac{\operatorname{arcosh}^+ x - \ln (x - \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arcosh}^+ x - \ln x} \\ \frac{\operatorname{arcosh}^+ x - \ln (x - \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arcosh}^+ x - \ln x} \\ \frac{\operatorname{arcosh}^+ x - \ln (x - \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arcosh}^+ x - \ln x} \\ \frac{\operatorname{arcosh}^+ x - \ln (x - \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arcosh}^+ x - \ln x} \\ \frac{\operatorname{arcosh}^+ x - \ln (x - \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln (x - \sqrt{x^2 - 1})_x \ge 1}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{\operatorname{arcosh}^+ x - \ln x}} \\ \frac{\operatorname{arcosh}^+ x - \ln x}{arc$
Area of sector Definition Cartesian Form Modulus Argument Form De Moivres' Theorem Roots of z" = 1 Eigenvalues Eigenvectors	$\begin{array}{c} a \\ a \\ 5 \\ 5 \\ 6 \\ 6 \\ 7 \\ 7 \\ \end{array}$	β , γ and δ are the matter α and β are the matter β and β are	he roots $x^* + dx + e = 0$ $S = -\frac{1}{c}$, $p roduct: apy S = \frac{1}{c}, p roduct: apy S = \frac{1}{c}, p roduct: apy S = \frac{1}{c} roducts of triples of roots: y + \beta B + yS = \frac{1}{c} roducts of triples of roots: \frac{1}{2} \int r^* d\theta error 1$	$\alpha\beta\gamma + \beta\gamma\delta + \frac{1}{2}$ $x \text{ number } a + bl$ $\text{in you solve for } t$ $\text{if } t$ $\text{or } a + bl$ $\text{or } b + $	Inverse	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \cosh^+ x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= \sinh x \\ \arcsin x - \cosh^+ x &= \ln x + \sqrt{x^2 - 1}, x \geq 1 \\ \arcsin x - \cosh^+ x &= \sinh^+ x - \sinh^+ x + h + h + h + h + h + h + h + h + h $
Area of sector Definition Cartesian Form Modulus Argument Form De Moivres' Theorem Roots of z** = 1 Eigenvalues Eigenvectors Standard Form Parametric Form Eccentricity Fod Directrices	$\begin{array}{c} a \\ a \\ b \\ c \\ c$	β , γ and δ are the matter α and β are the matter α are the matter α and β are the matter α and α are the matter α are the	he roots $x^{2}+dx+e=0$ $S=-\frac{1}{c}, \operatorname{product:} a\beta\gamma\delta=\frac{a}{c}$ $S=-\frac{1}{c}, \operatorname{product:} a\beta\gamma\delta=\frac{a}{c}$ $S=-\frac{1}{c}, \operatorname{product:} a\beta\gamma\delta=\frac{a}{c}$ $\gamma+\beta\delta+\gamma\delta=\frac{a}{c}$ $\gamma+\beta\delta+\gamma\delta=\frac{a}{c}$ $\frac{a-1}{c}, \operatorname{product}=\frac{(-1)^{n}a_{0}}{a_{0}}$ $\frac{a-1}{c}, \operatorname{product}=\frac{(-1)^{n}a_{0}}{a_{0}}$ $\frac{a-1}{c}, \operatorname{product}=\frac{(-1)^{n}a_{0}}{a_{0}}$ $\frac{a-1}{c}$ $\frac{1}{c}\int r^{2}d\theta$ ers $\frac{1}{c}\int r^{2}d\theta$ $\frac{1}{c}\int r^{2}$	$a\beta\gamma + \beta\gamma\delta + $ $x \text{ number } a + bi$ $\text{in you solve for } t)$ $t)$ g $-AI) \text{ equal to}$ e $a \text{ matrix. Multiply } of y$ $xy = c^{2}$ (cc^{2}_{r}) $e = \sqrt{2}$ $(t\pm\sqrt{2}c, \pm\sqrt{2}c)$ $x + y = \pm\sqrt{2}c$	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs F = Force needed to extend or compress T=tension x = length of extension/compression k = stiffness constant (spring constant measured in Nym i = modulus of elasticity (spring modulus) measured in Newtons I = matural length of the spring Energy Note: if answer is negative then means a loss Work Done • Wework done • Mework done • F = mapprilude of the force • d = distance moved IN THE DIRECTION of the force • d = angle between the force and the displacement • Total energy = Kinetic + Potential + Elastic	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \tanh x - \frac{\sinh x}{x} \\ \frac{\sinh x}{x} - \operatorname{sch}^+ x &= 1 \\ \tanh x - \frac{\sinh x}{x} \\ \frac{\operatorname{arcsh} x - \operatorname{csh}^+ x = 1}{\operatorname{arshh} x - \operatorname{csh}^+ x + \sinh^+ x} \\ \frac{\operatorname{arcsh} x - \operatorname{csh}^+ x - \ln (x + \sqrt{x^2 - 1}), x \geq 1}{\operatorname{arshh} x - \sinh^+ x} \\ \frac{\operatorname{arcsh} x - \operatorname{csh}^+ x - \ln (x + \sqrt{x^2 - 1}), x \geq 1}{\operatorname{arshh} x - \sinh^+ x} \\ \frac{\operatorname{arcsh} x - \ln (x + \sqrt{x^2 - 1}), x \geq 1}{\operatorname{arshh} x - \sinh^+ x} \\ \frac{\operatorname{arcsh} x - \ln (x + \sqrt{x^2 - 1}), x \geq 1}{\operatorname{arshh} x - \sinh^+ x} \\ \frac{\operatorname{arcsh} x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arshh} x - \sinh^+ x} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh} x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})} \\ \frac{\operatorname{arcsh}^+ x - \ln (x + \sqrt{x^2 - 1})}{\operatorname{arcsh}$
Area of sector Definition Cartesian Form Modulus Argument Form De Moivres' Theorem Roots of z" = 1 Eigenvalues Eigenvectors Standard Form Parametric Form Ford	a. a. b. a.	β , γ and δ are the matter α and β are the matter α and β are the matter α and β are the matter β are the matter β and β are the matter β and β are the matter β are the matter β and β are the matter β are the matter β and β are the matter β are the matter β are the matter β and β are the matter β are the matter β and β are the matter β are the matter β and β are the matter β are the matter β and β are the matter β and β are the matter β are the matter β and β are the matter β an	he roots $x^{+} dx + e = 0$ $S = -\frac{1}{e}, \operatorname{product:} a\beta \gamma \delta = \frac{1}{e}, \operatorname{product:} a\beta \gamma \delta = \frac{1}{e}, \operatorname{product:} a\beta \gamma \delta = \frac{1}{e}$ $S = -\frac{1}{e}, \operatorname{product:} a\beta \gamma \delta = \frac{1}{e}$ $S = -\frac{1}{e}, \operatorname{product:} a\beta \gamma \delta = \frac{1}{e}$ $\frac{1}{e} = \frac{1}{e}, \frac{1}{e} = \frac{1}{e}$ $\frac{1}{e} = \frac{1}{e}, \frac{1}{e} = -1$ $\frac{1}{e} = \frac{1}{e}, \frac{1}{e} = -1$ $\frac{1}{e} = \frac{1}{e}, \frac{1}{e} = -1$ $\frac{1}{e} = \frac{1}{e} + \frac{1}{$	$a\beta\gamma + \beta\gamma\delta + \\$ as number $a + bi$ on you solve for $a + bi$ on you solve for $a + bi$ of	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs F = Force needed to extend or compress T-tension x = length of extension/compression k = stiffness constant (spring constant measured in N/m A = modulus of elasticity (spring modulus) I = natural length of the spring Energy Note: if answer is negative then means a loss Work Done • Wowork done • Wowork done • F = magnitude of the force • d = distance moved IN THE DIRECTION of the force • d = angle between the force and the displacement • Total energy = Kinetic + Potential + Elastic	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh^+ x - \operatorname{sch}^+ x &= 1 \end{aligned} $ $ \sinh^+ x - \operatorname{sch}^+ x - \operatorname{sch}$
Area of sector Definition Cartesian Form Modulus Argument Form De Moivres' Theorem Roots of z** = 1 Eigenvalues Eigenvectors Standard Form Parametric Form Parametric Ford Directrices Asymptotes	$\begin{array}{c} a \\ a \\ b \\ c \\ c$	β , γ and δ are the matter α and β are the matter α and β are the matter α and β are the matter β are the matter β and β are the matter β and β are the matter β are the matter β and β are the matter β and β are the matter β are the matter β and β are the matter β are the matter β and β are the matter β are the matter β are the matter β and β are the matter β and β are the matter β are the matter β and β are the matter β are the matter β and β are the matter β are the matter β and β are the matter β are the matter β and β ar	he roots $x^{2}+dx+e=0$ $S=-\frac{1}{c}, \operatorname{product:} a\beta\gamma\delta=\frac{a}{c}$ $S=-\frac{1}{c}, \operatorname{product:} a\beta\gamma\delta=\frac{a}{c}$ $S=-\frac{1}{c}, \operatorname{product:} a\beta\gamma\delta=\frac{a}{c}$ $\gamma+\beta\delta+\gamma\delta=\frac{a}{c}$ $\gamma+\beta\delta+\gamma\delta=\frac{a}{c}$ $\frac{a-1}{c}, \operatorname{product}=\frac{(-1)^{n}a_{0}}{a_{0}}$ $\frac{a-1}{c}, \operatorname{product}=\frac{(-1)^{n}a_{0}}{a_{0}}$ $\frac{a-1}{c}, \operatorname{product}=\frac{(-1)^{n}a_{0}}{a_{0}}$ $\frac{a-1}{c}$ $\frac{1}{c}\int r^{2}d\theta$ ers $\frac{1}{c}\int r^{2}d\theta$ $\frac{1}{c}\int r^{2}$	$a\beta\gamma + \beta\gamma\delta + $ $x \text{ number } a + bi$ $\text{in you solve for } t)$ $t)$ g $-AI) \text{ equal to}$ e $a \text{ matrix. Multiply } of y$ $xy = c^{2}$ (cc^{2}_{r}) $e = \sqrt{2}$ $(t\pm\sqrt{2}c, \pm\sqrt{2}c)$ $x + y = \pm\sqrt{2}c$	Inverse Fermat's Theorem	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \sinh x \\ \cosh^+ x &= 1 \end{aligned} $
Area of sector Definition Cartesian Form Modulus Argument Form De Moivres' Theorem Roots of z** = 1 Eigenvalues Eigenvalues Eigenvalues Cartesian Form Form Control of gradients Standard Form Parametric Form Parametric Ford Order of a group: Order of a nelemen Order of a nelemen	$\begin{array}{c} a,\\ a,\\ b,\\ c\\ c\\$	β , γ and δ are the matter α and β are the matter α and β are the matter α and β are the matter β are the matter β and β are the matter β are the matter β and β are the matter β and β are the matter β are the matter β and β are the matter β are the matter β are the matter β are the matter β and β are the matter β are the matter β and β are the matter β and β are the matter β and β are the matter β are the matter β and β are the matter β and β are the matter β and β are the matter β are the matter β and β are the matter β and β are the matter β are the matter β and	he roots $x^{+} + dx + e = 0$ $S = -\frac{1}{e}, \operatorname{product:} a\beta \gamma \delta = \frac{1}{e} \operatorname{product:} a\beta \gamma \delta \delta \delta = \frac{1}{e} \operatorname{product:} a\beta \gamma \delta $	$a\beta\gamma + \beta\gamma\delta + \frac{1}{2}$ $x \text{ number } a + bi$ $\text{in you solve for } t^{\frac{1}{2}}$ $t^{\frac{1}{2}}$ θ $-AI) \text{ equal to}$ e e $a \text{ matrix. Multiply } of y$ $xy = c^{\frac{1}{2}}$ $(ct{t}^{\frac{1}{2}})$ $x = -\sqrt{2}$ $(\pm \sqrt{2}c, \pm \sqrt{2}c)$ $x + y = \pm \sqrt{2}c$ $x = 0, y = 0$ $you \text{ get e in }$	Inverse Fermat's Theorem	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \coth^+ x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \end{aligned} $ $ \sinh x - \operatorname{sch}^+ x &= 1 \\ \sinh x - \operatorname{sch}^+ x &= 1 \\ \tanh x - \operatorname{sch}^+ x &= 1 \\ -\operatorname{sch}^+ x - \operatorname{sch}^+ x - \operatorname{sch}^+ x &= 1 \\ -\operatorname{sch}^+ x - \operatorname{sch}^+ x - \operatorname{sch}^+ x - \operatorname{sch}^+ x &= 1 \\ -\operatorname{sch}^+ x - \operatorname{sch}^+ x - \operatorname{sch}^+$
Area of sector Definition Cartesian Form Modulus Argument Form Eulers Form De Moivres' Theorem Roots of z** = 1 Eigenvalues Eigenvalues Eigenvalues Creamatric Form Parametric Form Parametric Form Corder of a group: Forder of an elemen modular arithmetic infinite order	$\begin{array}{c} a,\\ a,\\ b,\\ c\\ c\\$	β , γ and δ are the matter α and β are the matter α are the matter α and β are the matter α are the matter α and β are the matter α and α are the matter α are the matter α and α are the matter α are the matter α and α are the	he roots $x^* + dx + e = 0$ $S = -\frac{1}{c}, \operatorname{product:} a\beta y \delta = \frac{1}{c} \operatorname$	$a\beta\gamma + \beta\gamma\delta + \frac{1}{2}$ $x \text{ number } a + bi$ $\text{in you solve for } t^{\frac{1}{2}}$ $t^{\frac{1}{2}}$ θ $-AI) \text{ equal to}$ e e $a \text{ matrix. Multiply } of y$ $xy = c^{\frac{1}{2}}$ $(ct{t}^{\frac{1}{2}})$ $x = -\sqrt{2}$ $(\pm \sqrt{2}c, \pm \sqrt{2}c)$ $x + y = \pm \sqrt{2}c$ $x = 0, y = 0$ $you \text{ get e in }$	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs F = Force needed to extend or compress T=tension x = length of extension/compression k = stiffness constant (spring constant measured in Nym 2 = modulus of elasticity (spring modulus) measured in Newtons 1 = motion to elasticity (spring modulus) measured in Newtons 1 = motion to elasticity (spring modulus) measured in Newtons 1 = motion to elasticity (spring modulus) measured in Newtons 1 = motion to elasticity (spring modulus) measured in Newtons 1 = motion to elasticity (spring modulus) measured in Newtons 1 = motion to elasticity Note: if answer is negative then means a loss Work Done • Wi-work done • Wi-work done • Mi-motion to the force • d = angle between the force and the displacement • Total energy = Kinetic + Potential + Elastic Let n=1: Plug in n=1 to bo Assume n = k true i.e. P. assume this to be true. • Let n=1: Plug in n=1 to bo Assume n = k true i.e. P. assume this to be true.	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \cosh^+ x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= \cosh^+ x + \sinh^+ x \\ arcosh x &= \cosh^+ x + \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \frac{1}{2} \ln \left(\frac{4\pi^2}{12}\right), x < 1 \\ \end{aligned} $
Area of sector Definition Cartesian Form Modulus Argument Form Eulers Form De Moivres' Theorem Roots of z** = 1 Eigenvalues Eigenvalues Eigenvalues Creamatric Form Parametric Form Parametric Form Corder of a group: Forder of an elemen modular arithmetic infinite order	$\begin{array}{c} a,\\ a,\\ b,\\ c\\ c\\$	β , γ and δ are the matter α and β are the matter α are the matter α and β are the matter α are the matter α and β are the matter α and β are matter and β are the matter α and α	he roots $x^* + dx + e = 0$ $S = -\frac{1}{2}$, $p = 0$ $d = 1$ $d = 0$ $d = 1$ $d = 0$	$a\beta\gamma + \beta\gamma\delta + \frac{1}{2}$ $x \text{ number } a + bi$ $\text{in you solve for } t^{\frac{1}{2}}$ $t^{\frac{1}{2}}$ θ $-AI) \text{ equal to}$ e e $a \text{ matrix. Multiply } of y$ $xy = c^{\frac{1}{2}}$ $(ct{t}^{\frac{1}{2}})$ $x = -\sqrt{2}$ $(\pm \sqrt{2}c, \pm \sqrt{2}c)$ $x + y = \pm \sqrt{2}c$ $x = 0, y = 0$ $you \text{ get e in }$	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs F = Force needed to extend or compress T=tension x = length of extension/compression k = stiffness constant (spring constant measured in Nym A = modulus of elasticity (spring modulus) measured in Newtons I = matural length of the spring Energy Note: if answer is negative then means a loss Work Done ■ Mework done F = Meyork done I = Force needed to the force I = dedistance moved IN THE DIRECTION of the force I = angle between the force and the displacement I total energy = Kinetic + Potential + Elastic Let P _a be the proposition Let P _a be t	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \cosh^+ x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= \cosh^+ x + \sinh^+ x \\ arcosh x &= \cosh^+ x + \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \frac{1}{2} \ln \left(\frac{4\pi^2}{12}\right), x < 1 \\ \end{aligned} $
Area of sector Definition Cartesian Form Modulus Argument Form Eulers Form De Moivres' Theorem Roots of z** = 1 Eigenvalues Eigenvalues Eigenvalues Creamatric Form Parametric Form Parametric Form Corder of a group: Forder of an elemen modular arithmetic infinite order	$\begin{array}{c} a \\ a \\ \vdots \\ a \\ a \\ \vdots \\ a \\ a \\ \vdots \\ a \\ a$	β , γ and δ are the matter α and β are the matter α and β are the matter α and β are the matter β and β are matter β and β and β are matter β	he roots $x^* + dx + e = 0$ $S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = S = S = S = S = S = S = S = S =$	$a\beta\gamma + \beta\gamma\delta + \\$ $x \text{ number } a + bi$ $\text{in you solve for } r$ t t $-AI) \text{ equal to}$ e matrix. Multiply $of y$ $Rectangular \\ \text{thyerbolah} \\ xy = c^2$ $\left(cc, \frac{c}{r}\right)$ $e = \sqrt{2}$ $\left(\pm\sqrt{2}c, \pm\sqrt{2}c\right)$ $x + y = \pm\sqrt{2}c$ $x = 0, y = 0$ $\text{you get e in } \\ \text{say element has}$	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs F = Force needed to extend or compress Tetension x = length of extension/compression k = stiffness constant (spring constant measured in Nylm 2 = modulus of elasticity (spring modulus) measured in Newtons I = natural length of the spring Energy Note: if answer is negative then means a loss Work Done F = magnitude of the force I = adiatrace moved IN THE DIRECTION of the force I = angle between the force and the discensent discensent Total energy & Kinetic + Potential + Elastic Let P _a be the proposition Let n=1: Plug in n=1 to bo Assume n = k true i.e. P _a assume R + k + 1-Replace n sassumed P _a step to show work on the RHS also) ⇒ I So P _a true ⇒ P _a , true ∴ true for all n ∈ ···	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \cosh^+ x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= \cosh^+ x + \sinh^+ x \\ arcosh x &= \cosh^+ x + \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \frac{1}{2} \ln \left(\frac{4\pi^2}{2}\right), x < 1 \\ \end{aligned} $
Area of sector Definition Cartesian Form Modulus Argument Form Eulers Form De Moivres' Theorem Roots of z** = 1 Eigenvalues Eigenvalues Eigenvalues Creamatric Form Parametric Form Parametric Form Corder of a group: Forder of an elemen modular arithmetic infinite order	$\begin{array}{c} a \\ a \\ \vdots \\ a \\ 5 \\ 5 \\ \vdots \\ a \\ 5 \\ 5 \\ \vdots \\ a \\ 5 \\ 5 \\ \vdots \\ a \\ 5 \\ 5 \\ \vdots \\ a \\ 5 \\ 5 \\ \vdots \\ a \\ 5 \\ 5 \\ \vdots \\ a \\ 5 \\ 5 \\ \vdots \\ a \\ 5 \\ \vdots \\ 5 \\ \vdots \\ a \\ 5 \\ \vdots \\$	β , γ and δ are the material α and β are the material β are the material β and β are th	he roots $x^* + dx + e = 0$ $S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = S = S = S = S = S = S = S = S =$	$a\beta\gamma + \beta\gamma\delta + \\$ $x \text{ number } a + bi$ $\text{in you solve for } r$ t t $-AI) \text{ equal to}$ e matrix. Multiply $of y$ $Rectangular \\ \text{thyerbolah} \\ xy = c^2$ $\left(cc, \frac{c}{r}\right)$ $e = \sqrt{2}$ $\left(\pm\sqrt{2}c, \pm\sqrt{2}c\right)$ $x + y = \pm\sqrt{2}c$ $x = 0, y = 0$ $\text{you get e in } \\ \text{say element has}$	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs F = Force needed to extend or compress T=tension x = length of extension/compression k = stiffness constant (spring constant measured in Nym A = modulus of elasticity (spring modulus) measured in Newtons I = matural length of the spring Energy Note: if answer is negative then means a loss Work Done ■ Mework done F = Meyork done I = Force needed to the force I = dedistance moved IN THE DIRECTION of the force I = angle between the force and the displacement I total energy = Kinetic + Potential + Elastic Let P _a be the proposition Let P _a be t	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \cosh^+ x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= \cosh^+ x + \sinh^+ x \\ arcosh x &= \cosh^+ x + \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \frac{1}{2} \ln \left(\frac{4\pi^2}{2}\right), x < 1 \\ \end{aligned} $
Area of sector Definition Cartesian Form Modulus Argument Form De Moivres' Theorem Roots of z" = 1 Eigenvalues Eigenvalues Eigenvalues Cartesian Form Parametric Form Parametric Form Parametric Form Corder of a group: Forder of an elemen modular arithmetic infinite order	$\begin{array}{c} a \\ a \\ \vdots \\ a \\ a \\ \vdots \\ a \\ a \\ \vdots \\ a \\ a$	β , γ and δ are the matter α and β are the matter α and β are the matter α and β are the matter β and β are matter β and β and β are matter β	he roots $x^* + dx + e = 0$ $S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = -\frac{1}{c}$, $\operatorname{product} : a\beta y \delta = S = S = S = S = S = S = S = S = S =$	$a\beta\gamma + \beta\gamma\delta + \\$ $x \text{ number } a + bi$ $\text{in you solve for } r$ t t $-AI) \text{ equal to}$ e matrix. Multiply $of y$ $Rectangular \\ \text{thyerbolah} \\ xy = c^2$ $\left(cc, \frac{c}{r}\right)$ $e = \sqrt{2}$ $\left(\pm\sqrt{2}c, \pm\sqrt{2}c\right)$ $x + y = \pm\sqrt{2}c$ $x = 0, y = 0$ $\text{you get e in } \\ \text{say element has}$	Inverse Fermat's Theorem Centres Of Mass For Uniform Bodies Motion in A Circle Motion of a Projectile Elastic Strings and Springs F = Force needed to extend or compress Tetension x = length of extension/compression k = stiffness constant (spring constant measured in Nylm 2 = modulus of elasticity (spring modulus) measured in Newtons I = natural length of the spring Energy Note: if answer is negative then means a loss Work Done F = magnitude of the force I = adiatrace moved IN THE DIRECTION of the force I = angle between the force and the discensent discensent Total energy & Kinetic + Potential + Elastic Let P _a be the proposition Let n=1: Plug in n=1 to bo Assume n = k true i.e. P _a assume R + k + 1-Replace n sassumed P _a step to show work on the RHS also) ⇒ I So P _a true ⇒ P _a , true ∴ true for all n ∈ ···	$ \begin{aligned} \cosh^+ x - \sinh^+ x &= 1 \\ \cosh^+ x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= 1 \\ \sinh x - \cosh^+ x &= \cosh^+ x + \sinh^+ x \\ arcosh x &= \cosh^+ x + \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \ln (x + \sqrt{x^2 - 1}), x \geq 1 \\ arsh x + \sinh^+ x &= \frac{1}{2} \ln \left(\frac{4\pi^2}{2}\right), x < 1 \\ \end{aligned} $

1 '		Statistics & Probability
l	Binomial Distribution (discrete)	$x{\sim}B(n,p)$ E(X)=Mean=np, Var(X)= $np(1-p)$, $PMF=P(X=x)=\binom{n}{x}p^x(1-p)^{n-x}$ Calculator: = use pd, $\leq use\ cd$
	Poisson Distribution (discrete) (happening at average rate)	$x \sim Po(\lambda)$ Mean= λ , variance= λ , $PMF = P(X = x) = e^{-\lambda} \frac{\lambda^2}{ x }$
	Uniform Distribution (discrete)	Calculator: = use pd, \leq use cd $x\sim U[a,b]$ $Mean=\frac{1}{2}(a+b), \ variance=\frac{1}{2}(b-a)^{2}, \ PMF=P(X=x)=\frac{1}{b-a}$ To find unknowns: use fact that area of rectangle is the probability
	Geometric (discrete) (how long until 1st success)	To find probabilities: Find area of rectangle $\frac{X \cdot Coe(p)}{X \cdot Coe(p)}$ $\frac{W_0}{W_0} = \frac{1}{p}, \text{ variance} \frac{1-p}{p}$ $PMF = P(X = y p - p)^{n-1} P(X - y = (1-p)^{s}$ By hand: Need to turn all into $= r >$ and use formulae above
	Negative Binomial (discrete) (how long until r successes)	Calculator: = use pd , \leq use cd $x \sim NB(r, p)$ $PMF = P(x = k) = {k-1 \choose r-1} p^r (1-p)^{x-r}$ $Mean = {r \choose w} \text{ windnee} $ $m = {r \choose w} \text{ windnee}$
	Exponential (waiting time between poisson events)	$x \sim exp(\lambda)$ $PDF = P(x = k) = \lambda e^{-\lambda x}$ $Mean = \frac{1}{\lambda} \text{ variance} = \frac{1}{\lambda^2}$
	Normal Distribution (continuous)	$x \sim \mathcal{N}(\mu, \sigma^2)$ Mean= μ , variance= σ^2 , $PDF = P(X = x) = \frac{1}{\sigma \sqrt{2}\sigma} e^{-\frac{(x-\mu)^2}{\sigma^2}\delta^2}$ Standardised variable $z = \frac{x-\mu}{\sigma}$ To find probabilities: use invnorm on calculator To find x , μ , σ σ use invnorm on calculator
	Expected Value Discrete	$E(X) = \sum x P(X = x)$ For a function: $E(g(X)) = \sum g(x) P(X = x)$
	Expected Value Continuous	$E(X) = \int x f(x) dx$ For a function: $E(g(X)) = \int_{-\infty}^{\infty} g(x) f(x) dx$
	Variance Discrete Variance Continuous	$Var(X) = \sum x^2 P(X = x) - E(X)^2 = \sum x^2 P(X = x) - \mu^2$ $Var(X) = \int x^2 f(x) dx - E(X)^2 = \int x^2 f(x) dx - \mu^2$
	PDF and CDF	PDF: $f(x_0) = P(X = x_0)$ $CDF: F(x_0) = P(X \le x_0) = \int_{x_0}^{x_0} f(t) dt$ • PDF to CDF i.e. f to $F \Rightarrow$ integrate (or find areas under graph) Careful with integration if more than 2 functions, always start from the beginning CDF to PDF i.e. F to $F \Rightarrow$ differentiate (find gradients of graph) To find probabilities: find areas or integrate $f(x)$ or plug value straight into $F(x)$ Median-Find m such that $f_{invertinati}^{invertinati} f(x) dx = 0.5$
		 Mode: Solve f'(x) = 0 or if piecewise graph and see which x gives you highest point Finding unknowns or showing valid PDF:Use fact that \int f(x)dx = 1
	Probability Generating Function (PGF) PGF is for DRV's only and represents the PMF as a power series i.e. you can find certain (=) probabilities	Definition of RG: $\prod(x)$ or $G(x)$ or $G(x)$ be $E(x^*)$ by $\sum_{t=0}^{\infty} x^* P(X=k)$. Note: Sometimes use letter t instead of x Properties: $G(1)=1$, Mean= $\mathbb{E}[X]=G'(1)$ by Variance= $\mathbb{V}[X]=G''(1)+G'(1)-(G'(1))^2=G''(1)-\mu(\mu-1)$ if $Z=X+Y$, where X and Y independent: $G_x(t)=G_x(t) \times G_y(t)$
	from it Binomial: $(1-p+pt)^n$ Poisson: $e^{\lambda(t-1)}$ Geometric: $\frac{pt}{1-(1-p)t}$	Finding probabilities: $P(X=n) = \frac{1}{n!}G^{(n)}(0)$ PMF to PGF: Want answer as a power series Fill $P(X=k)$ into $\sum_{k=0}^{n} x_1 Z^k P(X=k)$ using PMF and get
	Negative Binomial: $\left(\frac{pt}{1-(1-p)t}\right)^{r}$	rid of sigma notation using geometric sum or binomial expan backwards PMF to PGF: PGF should be of the form $P(X=0)+zP(X=1)+z^2P(X=2)+$
	Moment Generating Function	$\begin{split} &M_x(t)=E(e^{us}) \text{ using either discrete or continuous Expected value def} \\ &\text{Uniform}=\frac{e^{us}-e^{us}}{2}, \text{ Exponential}=\frac{A}{\lambda-t}, \text{ Normal}=e^{pst}\frac{\pi}{2}e^{st}t^2 \end{split}$ $&\text{Binomial}=[(1-p)+pe^t]^n, \text{Poisson}=e^{\lambda(e^t-1)}, \text{ Geometric}=\frac{pe^t}{1-(1-p)e^t} \end{split}$
	Goodness of Fit Spearman's Rank	$x^2_{calc} = \sum \frac{(o-e)^2}{e}$. Reject if $x^2_{calc} > x^2_{criticat}$ $1 - \frac{6 \sum d^2}{e}$
	Expectation Algebra	$E(aX \pm b) = aE(X) \pm b, VAR(aX \pm b) = a^2Var(X)$ If X and Y independent:
	Unbiased Estimators	$E(XY) = E(X)E(Y), Var(aX \pm bY) = a^2Var(X) + b^2Var(Y)$ $= \sum_{x} \sum_{x}$
	Central Limit Theorem	$\overline{x} \sim N\left(\mu, \frac{\sigma^2}{n}\right)$
	Sample Proportion Test Statistics	$\hat{p} \sim N\left(p, \frac{p(1-p)}{n}\right)$ $7 = \frac{\hat{p}-p}{2} 7 = \frac{(\hat{p}_1 - \hat{p}_2) - (p_1 - p_2)}{2} 7/\Gamma = \frac{x-\mu}{2} 7 = \frac{x^2 - X_2 - (\mu_1 - \mu_2)}{2} 7 = \frac{x^2 - X_2 - (\mu_1 - \mu_2)}{2}$
		$\sqrt{\frac{x_1^2 - x_2^2}{n}} \stackrel{f_1 = \hat{p}_1}{\sim} \frac{1}{n_1} \frac{1}{n_2} \stackrel{f_2}{\sim} \frac{1}{n_2} \frac{1}{n_2} \stackrel{f_3}{\sim} \frac{1}{n_3} \frac{1}{n_2} $
1	Derivatives	Differentiation and Integration $\sin^{-1} f(x) \Rightarrow \frac{f'(x)}{\sqrt{1- x }} \qquad \cos^{-1} f(x) \Rightarrow -\frac{f'(x)}{\sqrt{1- x }}$
		$\tan^{-1} f(x) \Rightarrow \frac{f'(x)}{1+f(x)^2}$ $\tan^{-1} f(x) \Rightarrow \frac{f'(x)}{1+f(x)^2}$ $\sec^{-1} f(x) \Rightarrow \frac{f'(x)}{1+f(x)^2}$
		$\begin{aligned} &\cos e^{-1} f(x) \Rightarrow -\frac{f'(x)}{f(x)^2 f(x)^{1/2}} &\cot^{-1} f(x) \Rightarrow \frac{f'(x)}{f(x)^{1/2}} \\ &\sin h f(x) = f'(x) \cosh^{-1}(x) & \cosh^{-1} f(x) \Rightarrow \frac{f'(x)}{f(x)^{1/2}} \\ &\tanh f(x) \Rightarrow f'(x) \operatorname{sech}^{-1} f(x) & \sinh^{-1} f(x) \Rightarrow \frac{f'(x)}{f(x)^{1/2}} \\ &\cosh^{-1} f(x) \Rightarrow \frac{f'(x)}{f(x)^{1/2}} & \tanh^{-1} f(x) \Rightarrow \frac{f'(x)}{1 - f(x)^{2}} \end{aligned}$
	Integrals	$\begin{aligned} & \text{sim} f(x) = f(x) \text{sech}(x) \\ & \text{tanh } f(x) \Rightarrow f'(x) \text{sech}(x) \\ & \text{tanh } f(x) \Rightarrow f'(x) \text{sech}(x) \\ & \text{tanh}^{-1} f(x) \Rightarrow \frac{f'(x)}{f(x)^{2} - 1} \\ & \text{tanh}^{-1} f(x) \Rightarrow \frac{f'(x)}{f(x)^{2} - 1} \\ & \text{tanh}^{-1} f(x) \Rightarrow \frac{f'(x)}{f(x)^{2} - 1} \\ & \text{tanh}^{-1} f(x) \Rightarrow \frac{f'(x)}{f(x)^{2}} \\ & \text{tanh}^{-1} f(x) \Rightarrow \frac{f'(x)}$
	Integrals Volume of Revolution Surface area of revolution	$\begin{aligned} & \text{sim} \ f(x) = f(x) \text{sech}(x) \\ & \text{tanh } f(x) = f'(x) \text{sech}(x) \\ & \text{tanh } f(x) = f'(x) \text{sech}(x) \\ & \text{tanh } f'(x) = \frac{f'(x)}{\sqrt{1 + f(x)^2}} \\ & \text{tanh}^{-1} f(x) = \frac{f'(x)}{\sqrt{1 + f(x)^2}} \\ & \text{tanh}^{-1} f(x) = \frac{f'(x)}{\sqrt{1 + f(x)^2}} \\ & \text{tanh}^{-1} f(x) = \frac{f'(x)}{1 - f(x)^2} \\ & \text{tanh}^{-1} f(x) = \frac{f'(x)}{1 - f$
	Volume of Revolution	$\begin{aligned} & \text{sim} \ f(x) = f(x) \text{sech}(x) \\ & \text{tanh} \ f(x) = f'(x) \text{sech}(x) \\ & \text{tanh} \ f(x) = f'(x) \\ & \text{cosh}^{-1} f(x) = \frac{f'(x)}{\sqrt{f(x)^2 - 1}} \\ & \text{tanh}^{-1} f(x) = \frac{f'(x)}{\sqrt{f(x)^2 - 1}} \\ & \text{tanh}^{-1} f(x) = \frac{f'(x)}{\sqrt{1 + f(x)^2}} \\ & \text{tanh}^{-1} f(x) = \frac{f'(x)}{1 - f(x)^2} \\ & \text{tanh}^{-1} f(x) = \frac{f'(x)}{1 - f(x)^2}$
	Volume of Revolution Surface area of revolution Arc Length	$\begin{aligned} & \operatorname{sim} f(x) = f(x) \operatorname{esch}(x) \\ & \operatorname{tah} f(x) \Rightarrow f'(x) \operatorname{sch}(x) \\ & \operatorname{tah} f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \operatorname{tah}^{-1} f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ &$
	Volume of Revolution Surface area of revolution Arc Length Integrating Factor Homogeneous and Non-Homogeneous and Non-Homogeneous and Non-Homogeneous and Non-Homogeneous and Non-Homogeneous and Non-Homogeneous and Non-	$\begin{aligned} & \sinh^{-1}(x) = i \left(x_i \right) \operatorname{sch}(x) \\ & \tanh f(x) = f'(x) \operatorname{sch}^{-1}(x) \\ & \sinh^{-1}f(x) = f'(x) \\ & -f(x) = \frac{f'(x)}{f(x)^{2}-1} \\ & + \int_{\frac{1}{x^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{x^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{x^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{x^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{x^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{x^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{x^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{(x)^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{(x)^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{(x)^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{(x)^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{(x)^{2}-(x)^{2}}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{(x)^{2}-(x)^{2}}} dx + \int_{\frac{1}{x}} dx + \int_{\frac{1}{x}} dx \\ & + \int_{\frac{1}{(x)^{2}-(x)^{2}}} dx + \int_{\frac{1}{x}} dx + \int_{\frac{1}{x}} dx + \int_{\frac{1}{x}} dx \\ & + \int_{\frac{1}{(x)^{2}-(x)^{2}}} dx + \int_{\frac{1}{x}} dx +$
	Volume of Revolution Surface area of revolution Arc Length Integrating Factor Homogeneous and Non-Homogeneous (Second Order) Solution Form:	$\begin{aligned} & \text{sim} \ f(x) = i \ (x) \text{cusin} \ f(x) & \Rightarrow f(x) \text{sent} \ f(x) \\ & \text{tanh} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f(x) \Rightarrow \frac{f'(x)}{\sqrt{f(x')} - 1} \\ & \text{tanh}^{-1} \ f($
	Volume of Revolution Surface area of revolution Arc Length Integrating Factor Homogeneous and Non-Homogeneous (Second Order)	$\begin{aligned} & \sinh^{-1}(x) = i \left(x_i \operatorname{cosin}(x) \right) \\ & \tanh f(x) = f'(x) \operatorname{sech}^+(x) \\ & \sinh^{-1}f(x) = \frac{f'(x)}{f_1(x)^2} \\ & \tanh^{-1}f(x) = \frac{f'(x)}{f_1(x)^2} \\ & + \int_{\frac{1}{x^2 - (2x)^2}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{x^2 - (2x)^2}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{x^2 - (2x)^2}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{x^2 - (2x)^2}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{x^2 - (2x)^2}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{(2x)^2 - 2x^2}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{(2x)^2 - 2x^2}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{(2x)^2 - 2x^2}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{(2x)^2 - 2x^2}} dx = \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & - \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & - \frac{1}{x} \sin^{-1}\left(\frac{x}{a}\right) + c \\ & + \int_{\frac{1}{(2x)^2 - 2x^2}} dx = \frac{1}{x} \ln\left \frac{1}{1} \frac{x - a}{x}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + c \\ & - \int_{\frac{1}{(2x)^2 - 2x^2}} dx - \frac{1}{x} \ln\left \frac{1}{x} \frac{x - a}{x^2}\right + $
	Volume of Revolution Surface area of revolution Arc Length Integrating Factor Homogeneous and Non-Homogeneous (Second Order) Solution Form:	$\begin{aligned} & \text{sinh}^{-1}(x) = (x) \cos(x) \\ & \text{sinh}^{-1}(x) & \Rightarrow \int_{1}^{1}(x) \\ & \text{coch}^{-1}f(x) & \text{coch}^{-1}f(x) \\ & \text{coch}^{-1}f(x) & coc$
	Volume of Revolution Surface area of revolution Arc Length Integrating Factor Homogeneous and Non-Homogeneous (Second Order) Solution Form: $y = y_{cf} + y_g$ Maclaurin Series	$\begin{aligned} & \text{sim} \ f(x) = i \ (x) \text{cest} \ f(x) \\ & \text{sinh}^{-1} f(x) \Rightarrow \frac{f(x)}{f(x)^{n-1}} \\ & \text{cesh}^{-1} f(x) \Rightarrow \frac{f'(x)}{f(x)^{n-1}} \\ & \text{sinh}^{-1} \frac{f(x)}{a^{n-1}} \\ & $