1\. a) CORRECT METHOD ELIMINATION OR COMPARISON OF COEFFICIENTS

e.g. $2x^3 - 3 \equiv A(x-1)^2 + B(x-1) + C$ OR SIMILAR M1

$A = 2 \quad B = 4 \quad C = -1$ A3

b) $2x + 4\ln|x-1| + (x-1)^{-1}$ M3 ft the coefficients only from (a)

$(\ldots) - (\ldots)$ ATTEMPTED CORRECTLY. M1 ft.

$\frac{3}{2} + 4\ln 2$ OR $\frac{3}{2} + \ln 16$ c.a.o A1

2\. a) USES GAP OF 0.25 (MAY BE IMPLIED FROM THEIR y VALUES) B1

1, 0.9394, 0.7788, 0.5698, 0.3679 MA1

(ALLOW ONE ERROR OR OMISSION)

$\frac{\text{"}0.25\text{"}}{2}\left[\text{"FIRST"} + \text{"LAST"} + 2 \times \text{"SUM OF REST"}\right]$ M1

AWRT 0.743

(ALLOW 0.74 WITH WORKING) A1

b) SIGHT OF $e^{-x^2} \times e^3$ M1

$e^3 \times$ "THEIR 0.743" OR A.W.R.T 14.9 MA1

3. a)

SIGHT OF $3x^2$ B1

$\frac{dx}{dV} \times \frac{dV}{dt}$ O.E OR $\frac{1}{3x^2} \times 0.108$ OR $\frac{9}{250x^2}$ M1

$\frac{9}{250 \times 3^2}$ OR SUBS $x=3$ INTO "THEIR" $\frac{dx}{dt}$ SO LONG AS $\frac{dx}{dt} = f(x)$ M1 ft

0.04 OR $\frac{1}{250}$ A1 c.a.o

b) SIGHT OF $12x$ B1

$12x \times \frac{9}{250x^2}$ OR $12x \times$ "0.004" M1 ft.

0.144 O.E e.g $\frac{18}{125}$ A1 c.a.o

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4. $12x^2$ $\pm 6y \pm 6x\frac{dy}{dx}$ + $3^y \ln 3 \times \frac{dy}{dy}$ M3

(ALLOW SIGN ERRORS)

$\frac{dy}{dx} = \frac{12x^2 - 6y}{6x - 3^y \ln 3}$ OR $12x^2 - 6y - 6x\frac{dy}{dx} + 3^y \ln 3 \frac{dy}{dx} = 0$ A1

SUBS $x=2, y=3$ INTO THEIR "$\frac{dy}{dx}$":
(MAY BE AN UNSIMPLIFIED EXPRESSION OF $\frac{dy}{dx}$) M1

$\frac{10}{4 - 9\ln 3}$ OBTAINED CORRECTLY OR $k=10$ A1

5. $-5 = \frac{a}{t} - 1$ B1

$3 = \frac{t+a}{t+1}$ B1

SOLVES SIMULTANEOUSLY, BY AT LEAST ONE NON TRIVIAL STEPS TO FIND a OR t M1

$t = -\frac{1}{2}$ A1

$a = 2$ A1

ATTEMPTS TO ELIMINATE t FROM PARAMETRICS WITHOUT a M1

CORRECTLY ARRIVES TO THE ANSWER GIVEN $y = \frac{2x+4}{x+3}$ MA1

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6. $x^2 \frac{dy}{dx} = y(x+1)$ B1

$\frac{1}{y}\,dy = \frac{x+1}{x^2}\,dx$ OR $\frac{1}{y}\,dy = \int \frac{1}{x} + \frac{1}{x^2}$ M1

INTEGRALS SEEN ON BOTH SIDES OF THEIR $\int f(y)\,dy = \int f(x)\,dx$ M1 ft.

$\ln y = \ln x - \frac{1}{x} + C$ o.e A3 −1 eeoo

$y = e^{\ln x - \frac{1}{x} + C}$ MA1

$y = Axe^{-\frac{1}{x}}$ (MAY USE ANY SENSIBLE LETTER INSTEAD OF A) A1 c.a.o

7. a) $1 + 2\cos 2x + \cos^2 2x$ B1

SIGHT OF $\frac{1}{2}+\frac{1}{2}\cos 4x$ OR $\cos 4x = 2\cos^2 2x - 1$ M1
OR $\frac{1}{2}+\frac{1}{2}\cos 2x$ OR $\cos 2x = 2\cos^2 x - 1$

$1 + 2\cos 2x + \left(\frac{1}{2}+\frac{1}{2}\cos 4x\right)$ SEEN DEPENDANT ON ANY OF THESE
BEFORE ARRIVING AT THE ANSWER GIVEN A1

b) $\pi\int_0^{\frac{\pi}{2}}(1+\cos 2x)^2\,dx$ OR $\pi\int_0^{\frac{\pi}{2}}\frac{3}{2}+2\cos 2x+\frac{1}{2}\cos 4x$ B1

$\frac{3}{2}x \quad + \sin 2x + \frac{1}{8}\sin 4x$ A3

$(\dots) - (\dots)$ e.g $\left(\frac{3\pi}{4}+0+0\right)-(0)$
OR $\frac{3\pi}{4}-0$

BEFORE CORRECTLY ARRIVING AT THE ANSWER GIVEN $\frac{3}{4}\pi^2$ MA1

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8. a) $2\lambda+10=6$ M1
$a=7 \quad b=5$ A1 A1

b) $y+2z=0$ M1
$x=7, \; y=\lambda+5, \; z=2\lambda+10$
(ALL 3 SEEN, MAY APPEAR IN PART a) M1
$(\lambda+5)+2(2\lambda+10)=0$ M1
$\lambda=-5$ A1
$Q(7,0,0)$ A1

c) $3:2$ B1 c.a.o

9. a) $1-3kx + 6k^2x^2 - 10k^3x^3$ M1 A3

(ONE METHOD MARK FOR AN UNSIMPLIFIED EXPANSION)
(ONE SMALL ERROR IS OK)

b) ATTEMPTS POLYNOMIAL MULTIPLICATION BETWEEN $(6-x)$ AND THEIR EXPANSION M1

SIGHT OF $3kx^2$ M1
SIGHT OF $36k^2x^2$ OR $36k^2$ M1

$36k^2+3k-3=0$ O.E e.g $12k^2+k-1=0$ M1

$(3k+1)(4k-1)$ M1

$k = \frac{1}{4}, -\frac{1}{3}$ (BOTH) A1

10. $-2x\cos 3x - \int -2\cos 3x$ O.E M1 STRUCTURE OF PARTS
M1 M1 EACH "LUMP"

$\pm \frac{2}{3}\sin 3x$ M1 dep

$\frac{2\pi}{3}$ c.a.o A1