Statistics S1   For Edexcel
Advanced Subsidiary

Paper F
Time: 1 hour 30 minutes

Instructions and Information

Candidates may use any calculator EXCEPT those with the facility for symbolic algebra, differentiation and/or integration.

Full marks may be obtained for answers to ALL questions.

The booklet 'Mathematical Formulae and Statistical Tables', available from Edexcel, may be used.

When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Advice to Candidates

You must show sufficient working to make your methods clear to an examiner.
Answers without working may gain no credit.

1. (*a*) Briefly describe what you understand by a statistical model. **(2)**

(*b*) Which of the following could be modelled by a normal distribution?

(i) The length of time it takes to fly from London to New York.

(ii) The number obtained by the roll of a die.

(iii) The shorter length when a ribbon is cut into two sections by a blind folded volunteer.

(iv) The mode of transport used by 50 pupils to get to school. **(4)**

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2. Claire has to drive through three sets of traffic lights on the way to work. Over a period of time she has come to realise that if one set is on green the probability that the next set is also on green is $\frac{3}{5}$, and if one set is on red the probability of the next also being red is $\frac{3}{4}$. One Monday morning the first set of lights are on green as she passes through.

Find the probability that:

(*a*) they are all green, **(3)**

(*b*) she only gets stopped at one set of traffic lights. **(3)**

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3. From previous tests a light bulb is found to have a lifetime that is normally distributed with a mean life of 2500 hours and a standard deviation of 30 hours.

(*a*) Find the probability that a given light bulb lasts for more than 2550 hours. **(3)**

(*b*) Find the probability that out of three such light bulbs at least two of them last for more than 2550 hours. **(3)**

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4. The total mass, in kg, of the 11 football players that started a match can be summarised as

$$\sum x = 808.5 \quad \text{and} \quad \sum x^2 = 59697$$

(*a*) Calculate the mean and the variance for these players. **(4)**

At half time two players of mass 72.5 kg and 74.5 kg are replaced by two players of mass 76.5 kg and 70.5 kg.

(*b*) What effect does this have on the mean and the variance of the team? **(4)**

5. The discrete random variable X has probability density function

$$f(x) = \begin{cases} k(x+2)^2 & x = 1, 2, 3 \\ k(7-x) & x = 4, 5 \\ 0 & \text{otherwise} \end{cases}$$

(*a*) Copy and complete the p.d.f. table page. **(4)**

x	1	2	3	4	5
$P(X = x)$			$25k$		

(*b*) Show that $k = \dfrac{1}{55}$. **(2)**

Find:

(*c*) $F(4)$ **(2)**

(*d*) $\mu = E(X)$ **(2)**

(*e*) $F(\mu)$

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6. The heights, h, in cm and the weights, w, in kg of ten people were taken and can be summarised as:
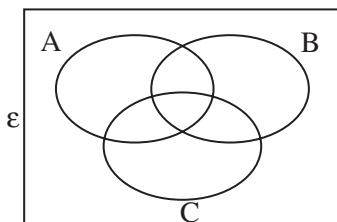
$$\sum h = 1822, \quad \sum w = 722, \quad \sum h^2 = 332308, \quad \sum w^2 = 52556 \text{ and } \sum hw = 131880$$

(*a*) Find the product moment correlation coefficient between h and w. **(6)**

(*b*) Calculate the regression line of w on h. **(4)**

(*c*) Would you use this equation to predict weights for all heights? Explain your answer. **(2)**

7.

The Venn diagram represents a universal set containing 36 members. The subsets A and B each contain 16 members and subset C contains 15 members.

$$n(A \cap B) = 5, \qquad n(B \cap C) = 8,$$
$$n(A \cap C) = 7, \qquad n(A \cap B \cap C) = 3$$

(*a*) Copy and complete the Venn diagram **(4)**

One member is selected at random. Find each of the following:

(*b*) $P(C')$ **(2)**

(*c*) $P(A \cap C')$ **(2)**

(*d*) $P(C'|A)$ **(2)**

(*e*) $P(A \cap C \cap B')$ **(2)**

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8. Summarised below are the marks obtained by a group of 100 students in a physics test.

Mark (%)	-19	$20-39$	$40-59$	$60-69$	$70-79$	$80-89$	$90-100$
Number of students	3	9	12	22	31	17	6

(*a*) Draw a histogram to illustrate this data. **(4)**

(*b*) Find the median and the upper and lower quartiles by interpolation. **(6)**

(*c*) Draw a box plot and hence describe the skewness of this data. **(5)**

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TOTAL 75 MARKS