

# Statistics S1(GCE)

## Practice Paper 1

(Standard A\*)

Time: 1 hour 30 minutes

**Materials required for examination**

Mathematical Formulae

**Items included with question papers**

Nil

**Instructions to Candidates**

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If you need more space to complete your answer to any question, use additional answer sheets.

**Information for Candidates**

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Full marks may be obtained for answers to ALL questions.

This paper has eight questions.

**Advice to Candidates**

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You must ensure that your answers to parts of questions are clearly labelled.

You must show sufficient working to make your methods clear to the examiner.

Answers without working may gain no credit.



1. The volume of a sample of gas is kept constant. The gas is heated and the pressure,  $p$ , is measured at 10 different temperatures,  $t$ . the results are summarised below.

$$\sum p = 450 \quad \sum p^2 = 38200 \quad \sum t = 260 \quad \sum t^2 = 27420 \quad \sum pt = 26730$$

(a) Find  $S_{pp}$  and  $S_{pt}$ . (3)

Given that  $S_{tt} = 20660$ ,

(b) Calculate the product moment correlation coefficient (2)

(c) Give an interpretation of your answer to part (b) (1)

(d) What is the 11<sup>th</sup> data (pressure,  $p$  and temperatures,  $t$ ) that should be added to the above summarised results to remains the same product moment correlation coefficient calculated in part (b) (2)

(e) For each of the following cases draw separate scatter diagrams and show the pattern using only 5 crosses (x)

$$(i) \ r = \frac{100}{100}, \quad (ii) \ r = -\frac{100}{100}, \quad (iii) \ r = \frac{0}{100}, \quad (iv) \ r = \frac{0}{0} \quad (4)$$

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2. The times  $t$  (in seconds) taken by *Mr.Swarna* to run 400 metres on nine successive days were  
53.2, 55.7, 54.2, 52.7, 53.6, 56.8, 54.0, 53.7, 59.8

(a) Show that the mean of the times is 54.9 minutes to 1 decimal place. (2)

(b) Calculate the standard deviation of the times. (3)

Given that the *mean* = 4 and the *standard deviation* = 2 for the integers 1, 2, 3, 4, 5, 6 and 7.

(c) Write down seven integers and show to *Mr.Swarna*, which have mean 23 and standard deviation 14. (3)

3. A group of athletes frequently run round a cross-country course in training.

The times taken by athletes *Swabi* and *Swaja* are given in the table below.

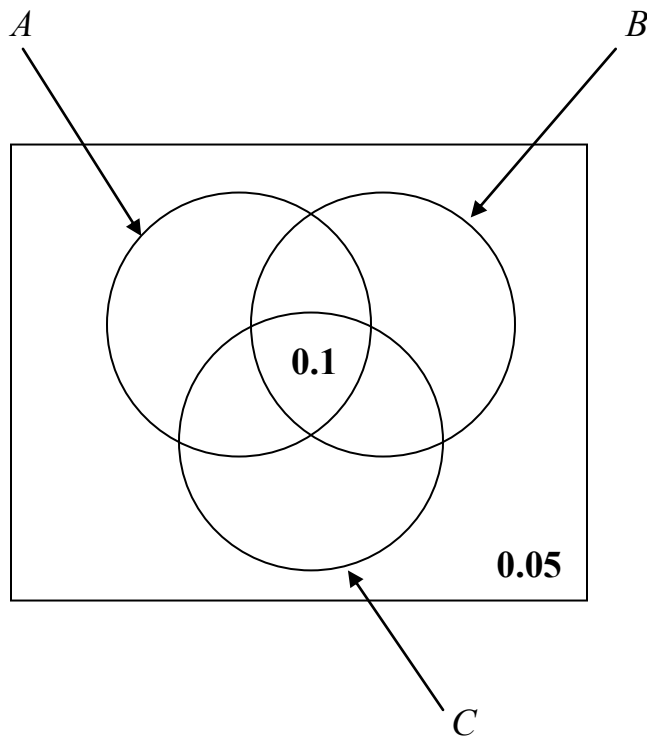
	Time (minutes)					
	Smallest	Lower quartile	Median	Upper quartile	Second largest	Largest
<i>Swabi</i>	20	26	27	30	31	35
<i>Swaja</i>	24	27	28	31	34	35

An outlier is an observation that falls more than  $Q_3 + 1.0(Q_3 - Q_1)$  or less than  $Q_1 - 1.0(Q_3 - Q_1)$ .

On graph paper construct two box and whisker plots for athletes *Swabi* and *Swaja*. Clearly indicate the outliers.

(7)

- 4.



Given that,

$$P(B \cap C) = 0.3, \quad P(A' \cap B' \cap C) = 0.15, \quad P(A \cup B') = 0.7, \quad P(A \cap B \cap C') = 0.2, \quad P(C \cup A') = 0.6$$

(a) Complete the above Venn diagram.

(6)

(b) Find  $P(A)$

(1)

(c) Find  $P(A|B)$

(2)

(d) Hence show that  $A$  and  $B$  are independent events

(1)

5. The random variable  $X$  has probability distribution

$x$	1	2	3	4	5
$P(X=x)$	$t$	$t$	$t$	$t$	$1-4t$

(a) Show that, for this to be valid distribution.  $0 \leq t \leq \frac{1}{4}$  (3)

Given that  $2P(X \leq 3) = 3P(X > 3)$

(b) Show that  $t = \frac{1}{5}$  (3)

(i) Write down the name of the distribution of  $X$  (1)

(ii) Find  $Var(X)$  (2)

6.

(a) For a set of data the equation of the regression line is  $y = 27.3 + 30.0x$

(i) If each  $x$  value increases by 10, find the new equation of the regression line (2)

(ii) If each  $x$  value increases by 10%, find the new equation of the regression line (2)

(b)

$x$	2	5	4	7	7
$y$	4	$p$	6	2	3

The equation of the regression line for the above five set of data is  $y = 7.2\dot{2} - 0.44\dot{4}x$

(i) Find the exact value of  $p$  (4)

(ii) When  $x = 5$  find the exact value of  $y$  using the above regression line (1)

(iii) Given that the Product moment correlation coefficient is  $-0.298$ . Explain why your predicted value of  $y$  in (ii) is different from the value of  $p$  in (i) (1)

7. **Swabi** says *no rain* and he is  $\frac{2}{3}$  accuracy of prediction. But **Swaja** says *rain* and she is  $\frac{3}{4}$  accuracy of prediction. What is the probability of rain? (Assuming the two predictions are independent)

(5)

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8. Given that  $P(Z \leq a) = b$ , where  $Z \sim N(0,1)$

(a) In the above equation if 2 decimal place  $a$  value is equal to the value of  $b$  to 2 decimal places, write down the values of  $a$ .

(2)

The random variable  $X$  represents the time spent in the gym by *Mr.Swarna* and it has been found from experience  $X$  can be modelled by normal distribution with mean 1 hour 10 minutes and standard deviation 25 minutes.

*Mr.Swarna* goes to gym every day.

(b) Estimate the number of days in a fortnight he spends between 1 hour 5 minutes and 2 hours 10 minutes in the gym.

(6)

(c) if  $P(X > m) = 99\%$  find  $m$  in minutes to 2 decimal places.

(4)

The gym closes at 9.00 pm.

(d) Estimate an approximation latest time of entry to *Mr.Swarna* for which the model above could still be plausible.

(2)

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**TOTAL FOR PAPER: 75 MARKS**

**END**