

Name:

Total Marks:

A level Applied Mathematics

Paper 3A Statistics

Practice Paper 4

Time: 60 mins



Information for Candidates

- This practice paper follows the Edexcel GCE A Level Specifications
- There are 5 questions in this question paper
- The total mark for this paper is 51.
- The marks for **each** question are shown in brackets.
- Full marks may be obtained for answers to ALL questions

Advice to candidates:

- 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 not gain full credit

Question 1

A midwife records the weights, in kg, of a sample of 50 babies born at a hospital. Her results are given in the table below.

Weight (w kg)	Frequency (f)	Weight midpoint (x)
$0 \leq w < 2$	1	1
$2 \leq w < 3$	8	2.5
$3 \leq w < 3.5$	17	3.25
$3.5 \leq w < 4$	17	3.75
$4 \leq w < 5$	7	4.5

[You may use $\sum fx^2 = 611.375$]

A histogram has been drawn to represent these data.

The bar representing the weight $2 \leq w < 3$ has a width of 1 cm and a height of 4 cm.

- (a) Calculate the width and height of the bar representing a weight of $3 \leq w < 3.5$ (3)
- (b) Use linear interpolation to estimate the median weight of these babies. (2)
- (c) (i) Show that an estimate of the mean weight of these babies is 3.43 kg. (3)
(ii) Find an estimate of the standard deviation of the weights of these babies. (3)

Shyam decides to model the weights of babies born at the hospital, by the random variable W , where $W \sim N(3.43, 0.65^2)$

- (d) Find $P(W < 3)$ (3)
- (e) With reference to your answers to (b), (c)(i) and (d) comment on Shyam's decision. (3)

A newborn baby weighing 3.43 kg is born at the hospital.

(f) Without carrying out any further calculations, state, giving a reason, what effect the addition of this newborn baby to the sample would have on your estimate of the

- (i) mean, (3)
(ii) standard deviation.

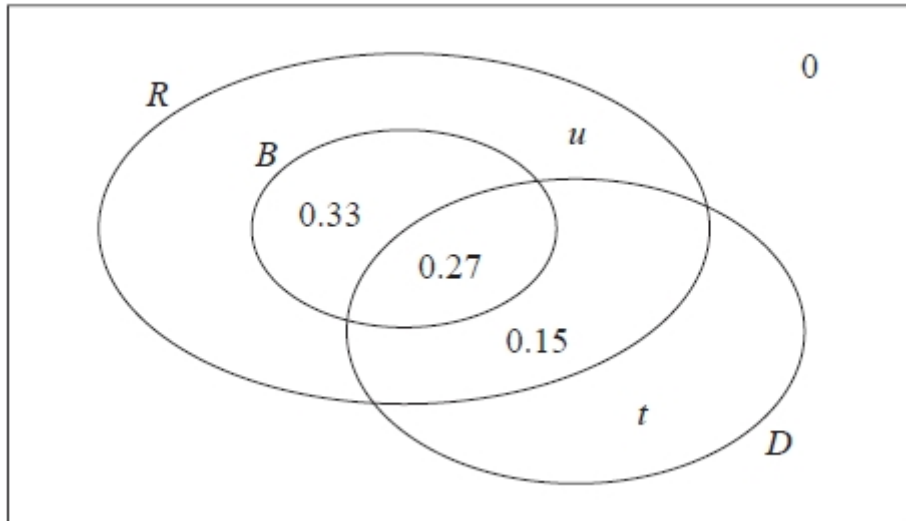
(Total for question = 17 marks)

Question 2

The Venn diagram shows the probabilities of customer bookings at Harry's hotel.

- R is the event that a customer books a room
- B is the event that a customer books breakfast
- D is the event that a customer books dinner

u and t are probabilities.



- (a) Write down the probability that a customer books breakfast but does not book a room. (1)

Given that the events B and D are independent

- (b) find the value of t (4)

- (c) hence find the value of u (2)

(d) Find

- (i) $P(D|R \cap B)$
- (ii) $P(D|R \cap B')$ (4)

A coach load of 77 customers arrive at Harry's hotel.

Of these 77 customers

- 40 have booked a room and breakfast
- 37 have booked a room without breakfast

- (e) Estimate how many of these 77 customers will book dinner. (2)

(Total for question = 13 marks)

Question 3

In a region of the UK, 5% of people have red hair. In a random sample of size n , taken from this region, the expected number of people with red hair is 3

(a) Calculate the value of n . (2)

A random sample of 20 people is taken from this region.

Find the probability that

- (b) (i) exactly 4 of these people have red hair,
(ii) at least 4 of these people have red hair. (5)

Patrick claims that *Reddman* people have a probability greater than 5% of having red hair.

In a random sample of 50 *Reddman* people, 4 of them have red hair.

(c) Stating your hypotheses clearly, test Patrick's claim. Use a 1% level of significance. (5)

(Total for question = 12 marks)

Question 4

From the large data set, the daily total rainfall, x mm, and the daily total sunshine, y hours, were recorded for Camborne on seven consecutive days in May 2015

<i>Rainfall, x</i>	2.2	tr	1.4	4.4	tr	0.2	0.6
<i>Sunshine, y</i>	5.2	7.7	5.6	0.3	5.1	0.1	8.9

(a) State the meaning of 'tr' in the table below (1)

(b) Calculate the product moment correlation coefficient for these 7 days, stating clearly how you deal with the entries marked 'tr' (2)

(c) With reference to your answer to part 'b', comment on the suitability of a linear regression model for these data (2)

(Total 5 marks)

Question 5

As part of a survey in a particular profession, age, x years, and yearly salary, £ y thousands, were recorded

The values of x and y for a randomly selected sample of ten members of the profession are as follows:

x	30	52	38	48	56	44	56	44	41	25	32	27
y	22	38	40	34	35	32	35	32	28	27	29	41

(b) Calculate, to 3 decimal places, the product moment correlation coefficient between age and salary. **(1)**

It is suggested that there is no correlation between age and salary

Test this suggestion at the 5% significance level, stating your null and alternate hypotheses clearly **(3)**

(Total 4 marks)

TOTAL FOR PAPER IS 51 MARKS
