TAYLOR'S UNIVERSITY COLLEGE

Wisdom · Integrity · Excellence

CAMBRIDGE A LEVEL PROGRAMME
SEMESTER ONE EXAMINATION DECEMBER 2008
(June 2008 Intake)

Friday   5 December 2008   8.30 am – 9.30 am

MATHEMATICS

PAPER 6   Probability & Statistics 1 (S1)   9709/6

1 hour

Additional materials: Answer Paper
                         Graph Paper
                         List of formulae (MF9)

READ THESE INSTRUCTIONS FIRST

Write your name and class on all the work you hand in.
Write in dark blue or black pen on both sides of the paper.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all the questions.

Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place in the case of angles in degrees, unless a different level of accuracy is specified in the question.
At the end of the examination, fasten all your work securely together.

The number of marks is given in brackets [ ] at the end of each question or part question.
The total marks for this paper is 40.
Questions carrying smaller numbers of marks are printed earlier in the paper, and questions carrying larger numbers of marks later in the paper.
The use of an electronic calculator is expected, where appropriate.
You are reminded of the need for clear presentation in your answers.
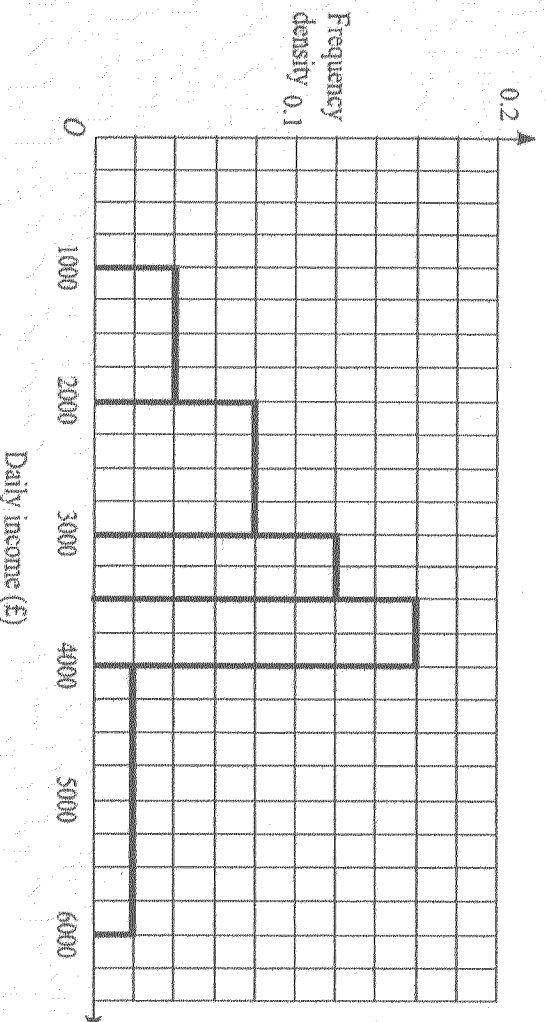

This document consists of 3 printed pages.

[Turn over

1. A discrete random variable X takes the values 0, 1, 2 and 3. Probability distribution of X is as follow:

x	0	1	2	3
$P[X = x]$	$\dfrac{1}{16}$	$\dfrac{1}{4}$	$\dfrac{1}{2}$	$\dfrac{3}{16}$

Find the mean and variance of X.

[3]

2.

(i) Each day, the Research Department of a retail firm records the firm's daily income, to be used for statistical analysis. The results are summarised by recording the number of days on which the daily income is within certain ranges.

The histogram above shows the results for **300 days**.

(a) Find the number of days on which the daily income was between £ 4000 and £6000.

[1]

(b) Calculate the probability that the daily income was between £2000 and £3000.

[2]

(ii) The research Department offers to provide any of the following statistical diagrams: histogram, box-and-whisker plot, stem-and-leaf diagram, cumulative frequency curve and pie chart.

Which one of these statistical diagrams would be most easily enable managers to

(a) read off the median and quartile values of the daily income?

[1]

(b) find the ranges of the top 10% of values of the daily income?

[1]

3. A student elects to solve a problem about compound interest using either arithmetic, algebraic or calculus method with corresponding probabilities of $\frac{2}{9}$, $\frac{4}{9}$ and $\frac{1}{3}$.

With each of these methods, the respective probabilities of obtaining the correct answer are $\frac{9}{10}$, $\frac{7}{8}$ and $\frac{3}{4}$.

Determine the probability that the student
(i) obtains the correct answer, [3]
(ii) uses algebraic method, given the answer is known to be incorrect. [3]

4. Each of the eight letters of the word DIVIDEND is printed on a separate card. The cards are arranged in a row.
(i) How many different arrangements of the cards are possible? [3]
(ii) In how many of these arrangements are all three Ds together? [2]

The eight cards are now shuffled and two cards are selected at random without replacement.
(iii) Find the probability that at least one of these cards has D printed on it. [3]

5. A shoe store's records show that 30% of customers making a purchase use credit cards to make payment.
(i) On one particular day, 15 customers purchased shoes from the store. Assuming independence, find the probability that
(a) none of them used credit card, [2]
(b) at least 3 customers, but not more than 5, used credit cards. [3]

(ii) Use a suitable approximation to find the probability that there are less than 30 customers making a purchase using credit cards, in a random sample of 80 customers. [4]

6. Uncle Albert keeps hens in his backyard. He regularly records the weights of the eggs that they lay and finds that the weights are normally distributed with a mean of 61 grams and standard deviation of 8 grams.
(i) One afternoon, uncle Albert checks to find a freshly laid egg in the hen coop. Calculate the probability that the egg weighs more than 67 grams. [3]
(ii) The next morning, uncle Albert finds six freshly laid eggs. Find the probability that at least two of these eggs weigh more that 67 grams. [3]
(iii) Uncle Albert claims that 95% of his eggs weigh more than k grams. Find k. [3]