

Please check the examination details below before entering your candidate information

Candidate surname

Other names

Centre Number

Candidate Number

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## Pearson Edexcel International Advanced Level

Time 1 hour 30 minutes

Paper

reference

**WST03/01**

### Mathematics

#### International Advanced Subsidiary/Advanced Level Statistics S3

**You must have:**

Mathematical Formulae and Statistical Tables (Yellow), calculator

Total Marks

**Candidates may use any calculator permitted by Pearson regulations. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.**

#### Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B).
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided  
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Values from the statistical tables should be quoted in full. If a calculator is used instead of the tables, the value should be given to an equivalent degree of accuracy.
- Inexact answers should be given to three significant figures unless otherwise stated.

#### Information

- A booklet 'Mathematical Formulae and Statistical Tables' is provided.
- There are 7 questions in this question paper. The total mark for this paper is 75.
- The marks for **each** question are shown in brackets  
– *use this as a guide as to how much time to spend on each question.*

#### Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.
- If you change your mind about an answer, cross it out and put your new answer and any working underneath.

Turn over ►

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- Use a suitable test, at the 5% level of significance, to determine whether there is evidence to support the manager's claim. State your hypotheses clearly.

(5)

Question 1 continued

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Q1

(Total 5 marks)





**Question 2 continued**

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**Q2**

**(Total 8 marks)**



3. A cafe owner wishes to know whether the price of strawberry jam is related to the taste of the jam. He finds a website that lists the price per 100 grams and a mark for the taste, out of 100, awarded by a judge, for 9 different strawberry jams  $A, B, C, D, E, F, G, H$  and  $I$ . He then ranks the marks for taste and the prices.

The ranks are shown in the table below.

Rank	1	2	3	4	5	6	7	8	9
Price	$A$	$B$	$E$	$C$	$D$	$F$	$G$	$H$	$I$
Taste	$A$	$B$	$F$	$E$	$H$	$G$	$I$	$C$	$D$

- (a) Calculate Spearman's rank correlation coefficient for these data. (5)

- (b) Test, at the 5% level of significance, whether or not there is a relationship between the price and the taste of these strawberry jams. State your hypotheses clearly. (3)

A friend suggests that it would be better to use the price per 100 grams,  $c$ , and the mark for the taste,  $m$ , for each strawberry jam rather than rank them.

Given that

$$S_{cc} = 2.0455 \quad S_{mm} = 243.5556 \quad S_{cm} = 16.4943$$

- (c) calculate the product moment correlation coefficient between the price and the mark for taste of these strawberry jams, giving your answer correct to 3 decimal places. (2)
- (d) Use your value of the product moment correlation coefficient to test, at the 5% level of significance, whether or not there is evidence of a positive correlation between the price and the mark for taste of these 9 strawberry jams. State your hypotheses clearly. (3)
- (e) State which of the tests in parts (b) and (d) is more appropriate for the cafe owner to use. Give a reason for your answer. (1)

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Question 3 continued

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Question 3 continued

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Question 3 continued

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(Total 14 marks)

Q3

Grading box for Q3.



4. A local village radio station, *LSB*, decides to survey adults in its broadcasting area about the programmes it produces.

*LSB* broadcasts to 4 villages A, B, C and D.

The number of households in each of the villages is given below.

Village	Number of households
A	41
B	164
C	123
D	82

*LSB* decides to take a stratified sample of 200 households.

- (a) Explain how to select the households for this stratified sample.

(3)

One of the questions in the survey related to the age group of each member of the household and whether they listen to *LSB*. The data received are shown below.

	Age group		
	18–49	50–69	Older than 69
<b>Listen to <i>LSB</i></b>	130	162	65
<b>Do not listen to <i>LSB</i></b>	78	98	62

The data are to be used to determine whether or not there is an association between the age group and whether they listen to *LSB*.

- (b) Calculate the expected frequencies for the age group 50–69 that

(i) listen to *LSB*

(ii) do not listen to *LSB*

(2)

Given that for the **other 4** classes  $\sum \frac{(O - E)^2}{E} = 4.657$  to 3 decimal places,

- (c) test at the 5% level of significance, whether or not there is evidence of an association between age and listening to *LSB*. Show your working clearly, stating the degrees of freedom and the critical value.

(6)



Question 4 continued

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Question 4 continued

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Question 4 continued

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(Total 11 marks)

Q4



- (4)

**Question 5 continued**

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**Q5**

**(Total 8 marks)**







Question 6 continued

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Question 6 continued

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Question 6 continued

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Q6

(Total 12 marks)



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Question 7 continued

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Question 7 continued

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Question 7 continued

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Question 7 continued

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Q7

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(Total 17 marks)

TOTAL FOR PAPER: 75 MARKS

END

