eClassroom

INTERNATIONAL A LEVEL MATHEMATICS • STATISTICS 2 (WST02)

Statistics 2 Practice Paper 3

Edexcel IAL Statistics 2

AIMING FOR A/A*

Written in the style of the Pearson Edexcel International Advanced Level paper (WST02/01) • Calculator allowed

A full 75-mark paper set above the hardest recent series: long questions, no route given and a trap in every question

Time	Total	You must have
1 hour 30 minutes	**75 marks**	**Mathematical Formulae and Statistical Tables, calculator**

Instructions

- Use black ink or ball-point pen. Pencil may be used for diagrams and sketches.
- Answer **all** questions, in the spaces provided.
- Show enough working to make your method clear. Answers without working may not gain full credit.
- Give inexact answers to **three significant figures** unless the question says otherwise.

Information

- There are 6 questions in this paper. The total mark is 75.
- The marks for each question are shown in brackets.

Advice

- Sit the paper in one go, in 1 hour 30 minutes, with the mark scheme closed.
- Read each question carefully and try every question. Check your answers if you have time.
- Then mark it line by line with the mark scheme and fill in your score.

Track your score

Q	Topic	Marks	Score
1	A sample size and two approximations	12	
2	Two Poisson tests on typing errors	12	
3	A pdf in two pieces	13	
4	A stick broken at random	13	
5	A binomial test with a normal approximation	12	
6	The sampling distribution of a median	13	
	Total	**75**	

Rough grade guide (out of 75): A* **56** • A **49** • B **40** • C **32**

Based on recent WST02 grade boundaries. Real boundaries change every series, so treat this as a guide, not a grade.

Mark scheme | Exam questions by topic | More practice papers

Name ..... Date .....

1. A factory makes electronic components, and each component is faulty with probability 0.08, independently of all other components.

(a) Find the smallest number of components that must be tested for the probability that at least one of them is faulty to be greater than 0.95

(4)

A batch contains 250 components.

(b) Using a suitable approximation, find the probability that fewer than 15 of the components in the batch are faulty. Give a reason for your choice of approximation.

(5)

A second factory makes the same components, each of which is faulty with probability 0.02

(c) Using a suitable approximation, find the probability that a batch of 250 components from the second factory contains more than 8 faulty components.

(3)

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Question 1 continued

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(Total for Question 1 is 12 marks)

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2. A typist makes errors at random, at a mean rate of 0.4 per page. A manager suspects that the typist's mean rate of errors has increased. She checks 5 pages typed by the typist.

(a) Write down suitable hypotheses to test the manager's suspicion.

(1)

(b) Find the critical region for the test at the 5% level of significance.

(3)

(c) Write down the actual significance level of the test.

(1)

The manager finds 5 errors on the 5 pages.

(d) Comment on the manager's suspicion, giving a reason for your answer.

(2)

A second typist claims that her mean rate of errors is less than 0.4 per page. The manager checks 25 pages typed by this typist and finds 4 errors.

(e) Test the second typist's claim at the 5% level of significance. State your hypotheses clearly.

(5)

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Question 2 continued

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(Total for Question 2 is 12 marks)

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3.

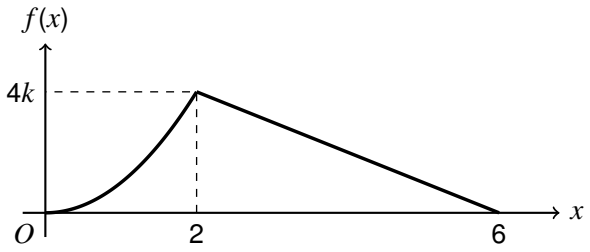

Figure 1

The continuous random variable X has probability density function

$$f(x) = \begin{cases} kx^2 & 0 \leqslant x \leqslant 2 \\ k(6-x) & 2 < x \leqslant 6 \\ 0 & \text{otherwise} \end{cases}$$

where k is a constant, as shown in Figure 1.

(a) Find the value of k

(3)

(b) Find the lower quartile of X

(2)

(c) Find F(x) for $2 < x \leqslant 6$

(3)

(d) Find the median of X

(3)

(e) Describe the skewness of the distribution, giving a reason for your answer.

(2)

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Question 3 continued

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(Total for Question 3 is 13 marks)

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4. A stick AB of length 60 cm is broken at a point P, chosen at random along its length. The random variable X is the length, in cm, of AP

(a) Find the probability that the shorter piece is less than one third of the length of the longer piece.

(3)

(b) Given that the shorter piece is less than one third of the length of the longer piece, find the probability that the shorter piece is less than 6 cm long.

(3)

The piece AP is bent to form the four sides of a square.

(c) Find the probability that the area of the square is greater than 100 cm^2

(2)

(d) Find the expected area of the square.

(3)

Ten such sticks are broken at random, independently.

(e) Find the probability that, for at least 6 of the sticks, the shorter piece is less than one third of the length of the longer piece.

(2)

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Question 4 continued

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(Total for Question 4 is 13 marks)

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5. In the past, 35% of the customers of a bank used its mobile app. After the app is redesigned, the bank believes that the proportion has fallen. A random sample of 200 customers is taken, and X is the number who use the app.

(a) Write down suitable hypotheses for a test of the bank's belief.

(1)

(b) Explain why a normal approximation is suitable for the distribution of X under the null hypothesis.

(1)

(c) Using a normal approximation, find the critical region for the test at the 5% level of significance.

(5)

(d) Using a normal approximation, find the actual significance level of the test.

(3)

In the sample, 59 customers use the app.

(e) State, with a reason, the conclusion of the test.

(2)

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Question 5 continued

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(Total for Question 5 is 12 marks)

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6. A large bag contains coins. Of the coins, 60% are 10c coins, 30% are 20c coins and 10% are 50c coins. A random sample of three coins is taken from the bag, and M is the median value, in cents, of the three coins.

(a) Explain why M is a statistic.

(1)

(b) Find the sampling distribution of M

(7)

(c) Find E(M)

(2)

(d) Find the probability that the median value of the three coins is equal to their mean value.

(3)

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Question 6 continued

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(Total for Question 6 is 13 marks)

TOTAL FOR PAPER IS 75 MARKS

END

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