2.5 Statistics: Hypothesis Testing: 10-minute Pack

EDEXCEL 9MA0 · Calculator allowed · about 10 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 A fairground stallholder claims that a coin-toss game pays out a prize with probability 0.3 on each play. A regular customer, Ben, suspects that the true probability of winning differs from 0.3. He watches a random sample of 20 plays of the game and observes that a prize is won on only 2 occasions. Let X be the number of plays, out of 20, that result in a prize.

(a) State suitable hypotheses for a two-tailed test of Ben's suspicion. **(2)**

(b) Assuming $X \sim B(20, 0.3)$, find $P(X \leq 2)$. **(3)**

(c) Using a 10% significance level, test whether there is evidence that the probability of winning a prize differs from 0.3. State your conclusion in context. **(3)**

(Total for Question 1 is 8 marks)

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Mark scheme · 2.5 Statistics: Hypothesis Testing: 10-minute Pack

Question 1

(a) H0: p = 0.3, where p is the probability of winning a prize	**B1**
(a) H1: p ≠ 0.3 (oe, two-tail test)	**B1**

(a) Answer: H0: p = 0.3, H1: p ≠ 0.3

(b) using X ~ B(20,0.3) and summing P(X=0)+P(X=1)+P(X=2)	**M1**
(b) two of P(X=0)=0.000798, P(X=1)=0.00684, P(X=2)=0.02785 correct (awrt)	**A1**
(b) P(X≤2) = 0.0355 (awrt cao)	**A1**

(b) Answer: P(X ≤ 2) = 0.0355 (awrt 3sf)

(c) compares 0.0355 with 0.05 (half of the 10% two-tail level)	**B1**
(c) 0.0355 < 0.05 so reject H0	**M1**
(c) conclusion in context (ft): significant evidence, at the 10% level, that the probability of winning a prize differs from 0.3 (appears lower than claimed)	**A1**

(c) Answer: 0.0355 < 0.05, so reject H0; there is significant evidence that the true probability of winning differs from 0.3.

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