

Edexcel IAL S2 Statistics 2 Practice Exam

Pearson Edexcel International A Level Mathematics · 15 questions · 60 marks

Name _____

Date _____

Score / 60

- Answer every question. Show your working: most marks are for method.
- Calculator allowed.
- Topics: Populations, samples and sampling distributions; The binomial distribution; The Poisson distribution; The continuous uniform distribution; Hypothesis testing; Approximations; Continuous random variables.
- The mark scheme is a separate free PDF: alevelmathrevision.com/alevel-frontend/downloads/practice-exams/ial/edexcel-ial-s2-statistics-2-practice-exam-mark-scheme.pdf

- A library wants to survey its borrowers. It has a list of the names of all 3000 people who hold a library card. [2]

 - Suggest a suitable sampling frame. [1]
 - Identify the sampling units. [1]
- On a production line 20% of loaves are underweight. An inspector weighs 25 loaves, and X is the number that are underweight. Find the probability that more than 3 but no more than 8 of them are underweight. [3]
- Flaws in cloth of type A occur at random at a mean rate of 1.5 per square metre, and in cloth of type B at a mean rate of 2.5 per square metre, independently. One square metre of each type is inspected. Find the probability that the total number of flaws found is at most 2. [3]
- A company makes fireworks. It wants to know the proportion of its fireworks that fail to ignite. [3]

 - Explain why the company should use a sample rather than a census. [1]
 - Suggest a suitable sampling frame and identify the sampling units. [2]



5. A thin rod of length 30 cm is broken at a point X cm from one end, where X is uniformly distributed on $[0, 30]$. Find the probability that the shorter piece is less than 6 cm long. [4]
6. A supermarket believes that 40% of its customers use self-checkout. In a random sample of 30 customers, 6 use self-checkout. Test, at the 5% level of significance, whether the proportion is less than 40%. [4]
7. The number of visitors to a website in a minute has a Poisson distribution with mean 25. Use a normal approximation to find the probability that there are more than 31 visitors in a given minute. [4]
8. The continuous random variable X has probability density function $f(x) = k(4x - x^2)$ for $0 \leq x \leq 3$, and $f(x) = 0$ otherwise. [5]
1. Show that $k = \frac{1}{9}$. [2]
 2. Find $E(X)$. [3]
9. The number of calls received by a helpline in a 15-minute period has a Poisson distribution with mean 7. Find the smallest value of n for which the probability of receiving n or more calls in a 15-minute period is less than 0.05. [3]
10. The random variable $X \sim B(30, 0.4)$. Find the largest value of k such that $P(X \leq k) < 0.1$, and find $P(X > k)$ for this value of k . [4]



- 11.** A manufacturer claims that 25% of its components are made from recycled material. A buyer tests n components, and will reject the claim in favour of $p < 0.25$ if none of them is made from recycled material. Find the smallest value of n for which this outcome is significant at the 1% level. [4]

- 12.** A rare blood type occurs in 0.6% of the population. A blood bank tests 500 donors. [4]
1. Explain why a normal approximation is not suitable for the number of donors with this blood type. [1]
 2. Use a suitable approximation to find the probability that at least 5 donors have this blood type. [3]

- 13.** The random variable X is uniformly distributed on $[0, 20]$. [5]
1. Find $P(X > 15 \mid X > 8)$. [3]
 2. Find $P(|X - 10| > 4)$. [2]

- 14.** The continuous random variable X has probability density function [6]

$$f(x) = \begin{cases} \frac{x}{4}, & 0 \leq x \leq 2 \\ \frac{4-x}{4}, & 2 < x \leq 4 \\ 0, & \text{otherwise.} \end{cases}$$

1. Find the lower quartile of X . [2]
2. Find the upper quartile of X . [3]
3. Find the interquartile range. [1]



15. In a large batch of phone cases, 10% are faulty. A quality inspector takes a random sample of 5 cases, [6] and Y is the number of faulty cases in the sample.
1. Explain why Y is a statistic. [1]
 2. Find the sampling distribution of Y . [4]
 3. The batch is rejected if the sample contains 2 or more faulty cases. Find the probability that the batch is rejected. [1]

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