

Big tournament statistics for A Level: answers

A Level Math Revision · A Level Maths (Year 12 and Year 13) · Teacher answers and notes

The starter is non-calculator. A calculator with statistics functions is needed.

Teacher notes

- Every number in this pack is made up for the lesson; say so when you show it.
- In task A (c), check that students write hypotheses about ρ , the population correlation, not r .
- Task B (c) is a good spreadsheet task: a 6 by 6 table of joint probabilities.

Starter

1. **5**
 - $25 \div 5$
2. **14.6**
 - $146 \div 10$
3. **$\frac{3}{8}$**
 - ${}^4C_2 \times (\frac{1}{2})^4 = 6/16 = 3/8$
4. **0.5**
 - The distribution is symmetrical about 0.

Task A: Shots and goals

- a. **0.989**
 - Calculator: $r = 0.98894...$
- b. **$y = 0.499x - 2.29$; about one extra goal for every two extra shots on target**
 - Calculator: $y = 0.49898...x - 2.2851...$
 - The gradient 0.499 means each extra shot on target goes with about 0.5 extra goals.
- c. **Reject H_0 : there is evidence of positive correlation**
 - $H_0: \rho = 0$; $H_1: \rho > 0$.
 - $0.989 > 0.5494$, so reject H_0 .

Task B: Penalty shoot-out

- a. **0.328**
 - $0.8^5 = 0.32768$
- b. **0.737**
 - $P(4) + P(5) = 5 \times 0.8^4 \times 0.2 + 0.8^5 = 0.4096 + 0.32768 = 0.73728$
- c. **0.501**
 - Add $P(A = i) \times P(B = j)$ over all $i > j$, with $A \sim B(5, 0.8)$ and $B \sim B(5, 0.7)$.
 - The total is 0.50083...

Task C: Race times

- a. **0.0912**
 - Standardise: $z = (10.0 - 10.2)/0.15 = -1.333...$; $P(Z < -1.333...) = 0.0912$

b. **9.95 s**

- $z = -1.6449$; $10.2 - 1.6449 \times 0.15 = 9.953\dots$

c. **0.535**

- $1 - (1 - 0.0912\dots)^8 = 0.5347\dots$

Extension

1. **0.156 s**

- $P(T < 10.0) = 0.1$ gives $(10.0 - 10.2)/\sigma = -1.2816$.
- $\sigma = 0.2 \div 1.2816 = 0.1561\dots$

Every question is original and every answer was recomputed by computer before publishing.