



ANSWER BOOK

Testing a correlation coefficient

Further Statistics 2 · Year FM

6 questions · 20 marks

NAVY EDITION

SECTION A · Warm-up

- A1** $H_0: \rho = 0$ and $H_1: \rho > 0$, where ρ is the population correlation coefficient. The sample value r is what was measured, so it is the evidence, not the claim; putting it in a hypothesis would be asserting something already known. [2]
- A2** $H_0: \rho = 0$; $H_1: \rho > 0$, one-tailed at 5% with $n = 12$. Since $0.62 > 0.4973$ the result lies in the critical region, so **reject H_0** : there is evidence at the 5% level of positive correlation between the two variables in the population. [1]

SECTION B · Standard

- B1** $H_0: \rho = 0$; $H_1: \rho \neq 0$, two-tailed at 5%, so 2.5% goes in each tail and the critical values are ± 0.7067 . Since $0.65 < 0.7067$, the result is not in the critical region: **do not reject H_0** . There is insufficient evidence at the 5% level of correlation. A one-tailed test at the same level would have used 0.6215 and rejected, which is why the tail must be settled before looking anything up. [4]
- B2** $H_0: \rho_s = 0$; $H_1: \rho_s > 0$, one-tailed at 5% with $n = 10$. Since $0.62 > 0.5636$, **reject H_0** : there is evidence at the 5% level that the rankings agree. Because the test uses only the orders, it makes no assumption about the shape of the underlying distributions and is unaffected by a single extreme value. [4]
- B3** The critical values assume the pairs are drawn from a population with a bivariate normal distribution. Formal verification is not expected, but the assumption should be stated as part of the conclusion, since the test is not valid without it. Spearman's test requires no such assumption. [3]

SECTION C · Stretch

- C1** With $n = 10$ the value 0.35 falls short of 0.5494, so H_0 is not rejected. With $n = 30$ the same value exceeds 0.3061, so H_0 is rejected. The identical coefficient is significant in one case and not in the other, so a coefficient means nothing without its sample size: a small sample can produce a moderate correlation by chance, while a large one cannot. Significance and strength are different questions. [4]