# Pearson correlation and coefficient of determination

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

**1.** Given Sxx=16, Syy=25 and Sxy=18, calculate r and $r^2$. [3 marks]

The denominator is $\sqrt{(16\times25)}=20$.

Divide 18 by 20 and square the result.

**Answer:** r=0.9; $r^2=0.81$.

**2.** A fit has r=-0.75. State its direction and percentage of response variation explained. [3 marks]

The sign gives negative association.

$100\times(-0.75)^2=56.25$.

**Answer:** Negative direction; 56.25% explained.

**3.** A student reports r=1.12. Explain the problem. [3 marks]

The theoretical range is $-1\leq r\leq1$.

Check data pairing, entry and the calculation.

**Answer:** A Pearson correlation cannot exceed 1.

**4.** A fitted model has $r^2=0.49$ and a negative slope. Find r. [3 marks]

Take the square root, giving magnitude 0.7.

Use the slope direction to choose the negative sign.

**Answer:** r=-0.7.

**5.** If every x-value is converted from metres to centimetres, what happens to r? [3 marks]

Multiplication by a positive constant changes scale, not linear correlation.

**Answer:** It stays the same.

**6.** All five response values are 7. Why is Pearson r undefined? [3 marks]

A standardised measure of shared variation cannot be calculated.

**Answer:** The response has zero variation, so Syy=0 and the denominator is zero.