Normal probabilities and inverse-normal values

6 questions | 18 marks

Equivalent correct methods earn the corresponding marks.

1. For Z standard normal, calculate $P(Z < 1.2)$. [3 marks]

Use the standard normal lower-tail function at 1.2.

Answer: 0.8849.

2. For Z standard normal, calculate $P(Z > 1.2)$. [3 marks]

Use $1 - \Phi(1.2)$.

Answer: 0.1151.

3. For X with mean 50 and SD 6, find $P(44 < X < 62)$. [3 marks]

The z-limits are -1 and 2.

Subtract $\Phi(-1)$ from $\Phi(2)$.

Answer: 0.8186.

4. For X with mean 100 and SD 12, find the 25th percentile. [3 marks]

Use $z = \Phi^{-1}(0.25)$.

Calculate $100 + 12z$.

Answer: 91.91.

5. A normal quality model gives $P(\text{pass}) = 0.94$. Out of 250 items, find the expected number passing. [3 marks]

$\text{Expected count} = 250 \times 0.94$.

This is an expectation, not a guaranteed realised count.

Answer: 235.

6. Find the upper 5% cutoff for a normal variable with mean 40 and SD 3. [3 marks]

Top 5% means lower-tail area 0.95.

Calculate $40 + 3\Phi^{-1}(0.95)$.

Answer: 44.93.