Estimating proportions in normal models with appropriate technology

6 questions | 13 marks

Equivalent correct methods earn the corresponding marks.

1. For normal mean 60 and sd 4, find the z-score of 66. [2 marks]

$\frac{66-60}{4}=1.5.$

Answer: 1.5.

2. Using $\Phi(1.25)=0.89435$, find $P(Z>1.25)$. [2 marks]

$1-0.89435=0.10565.$

Answer: 0.10565.

3. Using $\Phi(0.5)=0.69146$ and $\Phi(-1)=0.15866$, find $P(-1<Z<0.5)$. [2 marks]

$0.69146-0.15866=0.53280.$

Answer: 0.53280.

4. For normal mean 120 and sd 10, estimate $P(X<105)$ using a normal-CDF tool. [2 marks]

$z=\frac{105-120}{10}=-1.5.$

$\Phi(-1.5)=0.0668072.$

Answer: Approximately 0.0668.

5. The inverse standard-normal value for cumulative area 0.90 is 1.28155. Find the 90th percentile of normal mean 80 and sd 6. [2 marks]

$x=80+6(1.28155)=87.6893.$

Answer: Approximately 87.69.

6. A normal model predicts a failure probability 0.023 for a batch of 400. Interpret the expected number and explain why it is not a promise. [3 marks]

$400\times0.023=9.2.$

A particular batch has an integer count and random variation.

Answer: Expected failures 9.2, so roughly 9 in the long-run-average sense.