Sampling distribution of a sample proportion

6 questions | 12 marks

Equivalent correct methods earn the corresponding marks.

1. For $p = 0.3$, $n = 400$, find sample-proportion mean and variance. [2 marks]

Variance $= \frac{0.3 \times 0.7}{400}$.

Answer: 0.3 and 0.000525.

2. For $p = 0.25$, $n = 300$, find sample-proportion SD. [2 marks]

$\sqrt{\frac{0.25(0.75)}{300}} = 0.025$.

Answer: 0.025.

3. Check normal expected-count conditions for $p = 0.02$, $n = 100$. [2 marks]

Expected failures are 98; both counts must be adequately large.

Answer: They fail: expected successes $= 2$.

4. For $p = 0.5, n = 100$, approximate $P(0.4 < \hat{p} < 0.6)$ without continuity correction. [2 marks]

SD $= 0.05$; standardised bounds are -2 and 2.

Answer: 0.9545 approximately.

5. Why cannot a sample of 20 have sample proportion exactly 0.333? [2 marks]

The numerator is an integer and the denominator is 20.

Answer: Possible values are integer multiples of 0.05.

6. Compare sample-proportion SDs for $n = 150$ and $n = 600$ with p fixed. [2 marks]

Quadrupling n divides the SD by two.

Answer: The second is half the first.