

1. True or False: The sampling distribution of \bar{x} is normal for any sample size if the population itself is normally distributed.

- A) True B) False

2. True or False: If the population distribution is strongly skewed to the right and the sample size is very small, the sampling distribution of \bar{x} may not be approximately normal.

- A) True B) False

3. True or False: By the Central Limit Theorem, the sampling distribution of \bar{x} becomes approximately normal when the sample size is sufficiently large, even if the population distribution is strongly skewed to the right.

- A) True B) False

4. [CH9] True or False: A 95% confidence interval presented as $\hat{p} \pm E$ means among all possible random samples of the same size n , 95% of those samples have a sample proportion \hat{p} value such that

$$\hat{p} \pm z_{\alpha/2} \sqrt{\frac{\hat{p}(1 - \hat{p})}{n}}$$

contains the true p .

- A) True B) False

5. True or False: The mean of the variable \hat{p} is always p , but the standard deviation of the variable \hat{p} is $\sqrt{\frac{p(1 - p)}{n}}$ only if \hat{p} is normally distributed.

- A) True B) False

6. A population has mean $\mu = 80$ and standard deviation $\sigma = 24$. Consider random samples of size $n = 64$. Find the standard deviation of the sampling distribution of \bar{x} .

- A) 24 B) 8 C) 3 D) 0.375

7. Suppose a population has mean $\mu = 120$ and standard deviation $\sigma = 30$. Fix $n = 100$. Is \bar{x} normally distributed? If a random sample of size 100 is selected, what is the probability that the sample mean is greater than 126?

- A) \bar{x} is normal, $P(\bar{x} > 126) = 0.0228$
B) \bar{x} is normal, $P(\bar{x} > 126) = 0.9772$
C) \bar{x} is not normal, $P(\bar{x} > 126) = 0.0228$
D) \bar{x} is not normal, $P(\bar{x} > 126) = 0.8413$

8. A population proportion is believed to be $p = 0.38$. What minimum sample size is needed so that the sampling distribution of \hat{p} is approximately normal?

- A) 10 B) 25 C) 42 D) 43

9. A random sample of 400 adults is selected. Suppose that $p = 32\%$ of adults prefer online shopping. Find the mean and standard deviation of the sampling distribution of \hat{p} .

- A) $\mu_{\hat{p}} = 0.32, \sigma_{\hat{p}} = 0.023$
B) $\mu_{\hat{p}} = 128, \sigma_{\hat{p}} = 9.32$
C) $\mu_{\hat{p}} = 0.50, \sigma_{\hat{p}} = 0.023$
D) $\mu_{\hat{p}} = 0.32, \sigma_{\hat{p}} = 0.32$

10. [CH9] Which formula gives the margin of error for estimating a population mean when the population standard deviation σ is **known**?

- A) $E = z_{\alpha/2} \sqrt{\frac{p(1-p)}{n}}$
B) $E = z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$
C) $E = t_{\alpha/2} \frac{\sigma}{\sqrt{n}}$
D) $E = t_{\alpha/2} \frac{s}{\sqrt{n}}$

11. [CH9] Which formula gives the margin of error for estimating a population proportion?

- A) $E = z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$
B) $E = \frac{p}{n}$
C) $E = z_{\alpha/2} \sqrt{\frac{\hat{p}(1-\hat{p})}{n}}$
D) $E = z_{\alpha/2} \sqrt{\frac{\sigma}{n}}$

Answer: C

12. [CH9] A researcher wants to estimate a population mean with a desired margin of error $E = 2$. Assume $\sigma = 10$ and use a 95% confidence level. What **minimum** sample size is required?

- A) 25 B) 49 C) 97 D) 96

13. [CH9]A pollster wants to estimate a population proportion with margin of error $E = 0.04$ at the 95% confidence level. A previous study suggests $p = 0.60$. What minimum sample size is required?

- A) 576 B) 400 C) 300 D) 225

14. [CH9]A researcher wants to estimate a population proportion with margin of error $E = 0.03$ at the 95% confidence level, but no prior estimate of p is available. What minimum sample size is required?

- A) 385 B) 1068 C) 750 D) 500

15. [CH9]Construct a 95% confidence level for μ , given a sample with $\bar{x} = 72$, $n = 40$, $s = 10$.