

AP Statistics - Sampling Distributions and the Central Limit Theorem - Test

Common Core AP STAT 5.1, AP STAT 5.2, AP STAT 5.3, AP STAT 5.4, AP STAT 5.5, AP STAT 5.6, AP STAT 5.7, HSS-IC.A.1, HSS-IC.A.2 · maths-pdf.fr/en/

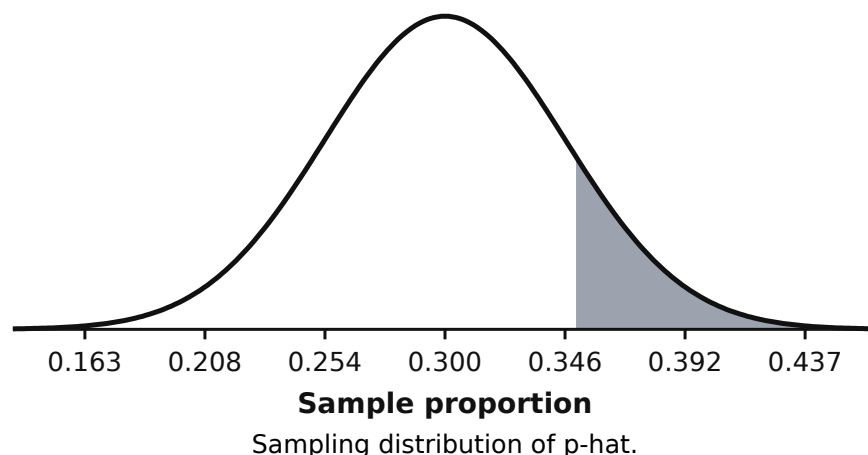
Name: _____ Class: _____ Date: ____/____/____

This 45-minute test covers sampling distributions for proportions and means, conditions, the central limit theorem, and differences. Show the mean, the standard deviation, and the conditions before every probability.

About this test

- Grade: AP Statistics
- Chapter: Sampling Distributions and the Central Limit Theorem
- Standards: AP STAT 5.1, AP STAT 5.2, AP STAT 5.3, AP STAT 5.4, AP STAT 5.5, AP STAT 5.6, AP STAT 5.7, HSS-IC.A.1, HSS-IC.A.2
- Time: 45 minutes
- Total: 20 points

Question 1 - Proportion probability [4 pts]



In a population, 30% of people are left-handed or ambidextrous. A random sample of 100 is taken. (a) Find the mean and standard deviation of $\hat{p}$. (2 points) (b) Check the conditions for a normal model. (1 point) (c) Find $P(\hat{p} > 0.35)$. (1 point)

Question 2 - Sample mean [3 pts]

Waiting times at a drive-through have mean 4.2 minutes and sd 1.5 minutes (skewed right). A random sample of 36 customers is taken. (a) Describe the sampling distribution of $\bar{x}$. (2 points) (b) Find $P(\bar{x} > 4.6)$. (1 point)

Question 3 - Effect of n [2 pts]

For $p = 0.5$, find the standard deviation of $\hat{p}$ for $n = 100$ and $n = 400$, and state how much the spread decreases.

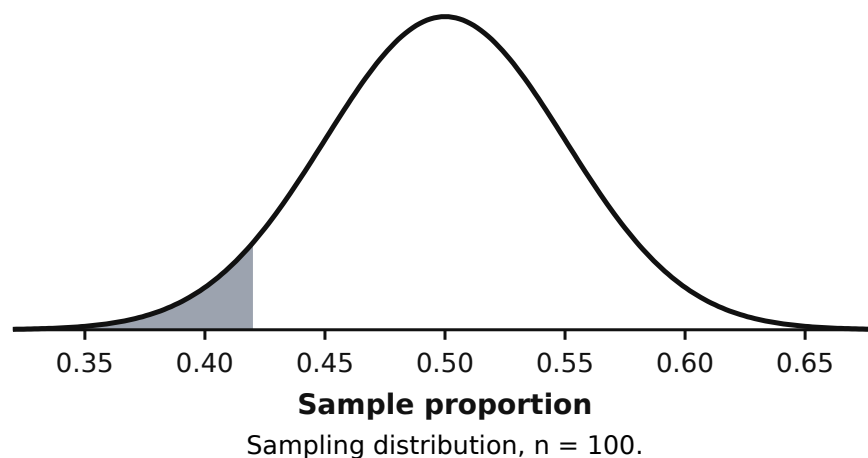
Question 4 - Bias and variability [2 pts]

Sketch in words two sampling distributions: one unbiased with high variability, one biased with low variability. Which is better and why?

Question 5 - Difference of proportions [3 pts]

Independent random samples of 80 boys ($p = 0.5$ own a bike) and 100 girls ($p = 0.4$ own a bike) are taken. Find the mean and standard deviation of $\hat{p}_{\text{boys}} - \hat{p}_{\text{girls}}$. (3 points)

Question 6 - Poll probability [2 pts]



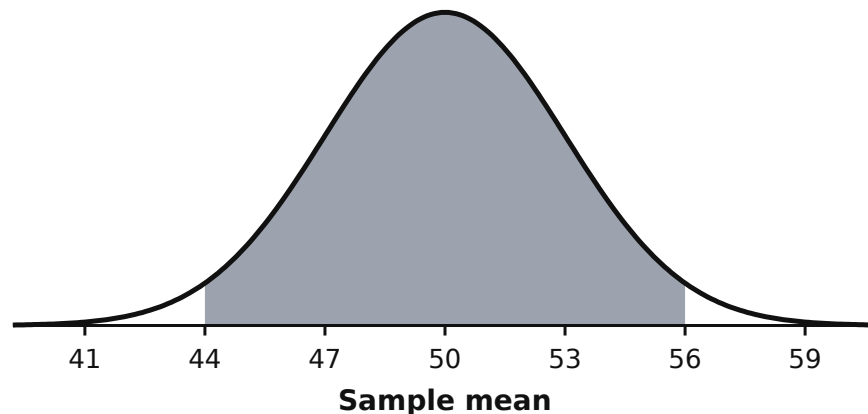
A candidate has true support of 50%. In a random sample of 100 voters, find the probability

that fewer than 42% support the candidate.

Question 7 - Conditions [2 pts]

A researcher wants to model the sample proportion for $n = 30$ and $p = 0.05$. Check the normality condition and conclude.

Question 8 - Within two standard errors [2 pts]



Sampling distribution of the mean for $n = 16$.

A normal population has mean 50 and sd 12. For $n = 16$, find the interval that contains about 95% of sample means.