

REVIEW: SAMPLING DISTRIBUTIONS

CHAPTER 18 -19

Answer the following questions thoughtfully and completely.

Name: _____

Period: _____

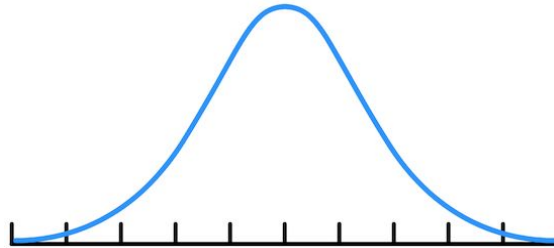
Class: _____

Test Date: _____

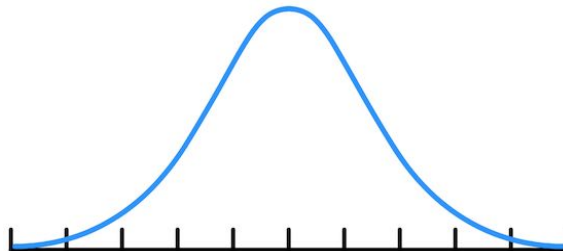
CHAPTER 18 REVIEW: SAMPLING DISTRIBUTIONS

Put extra notes to yourself here.

1. A national study reported that 82% of high school graduates pursue a college education immediately after graduation. Suppose a random sample of 220 graduates is conducted. Construct the sample distribution curve, labeling ± 3 standard deviations. State its MEAN and SAMPLE STANDARD DEVIATION.



2. The heights of people in a certain population are normally distributed with a mean of 68 inches and a standard deviation of 4 inches. Describe the sampling distribution for a sample of size 64. Construct the sample distribution curve, labeling ± 3 standard deviations. State its MEAN and SAMPLE STANDARD DEVIATION.



Determine whether the Normal model may be used to describe the distribution of the sample proportions. If the Normal model may be used, list the conditions and explain why each is satisfied. If Normal model may not be used, explain which condition is not satisfied.

3. A candy company claims that 70% of the candy bars are made with peanuts. Suppose that a single simple random sample of 25 candy bars are selected from a shipment of 5000. Is it appropriate to use a Normal model to describe the distribution of the proportion of candy bars that contain peanuts?

4. The amount of annual snowfall falling in a certain mountain range is slightly skewed with a mean of 100 inches, and a standard deviation of 15 inches. Measurements have been taken for the past 200 years. Suppose that the snowfall for 12 randomly selected years has been collected. Is it appropriate to use a Normal model to describe the distribution of the annual snowfall?

Find the specified probability. Assume that the necessary conditions and assumptions are met. For each problem you must state the probability statement: $P(X = \text{---})$ or $P(p = \text{---})$

5. A national study reported that 82% of high school graduates pursue a college education immediately after graduation. A local high school advertises that 187 of their 220 graduates last year went on to college. Find the probability that proportion of graduates in the local school is greater than the sample proportion.

6. The National Weather Service reports that 25% of the days in the year have only a 2 degree difference between the high and low temperature. Suppose that 20 random days are selected from a Normal population of records. What is the probability that less than 18% of the days will exhibit differences of 2 degrees.

7. Packages received by a parcel service have a mean weight of 12.3 pounds with a standard deviation of 3.2 pounds. On one particular day, the parcel service receives 38 packages. What is the probability that the average weight will exceed 13 pounds?

8. The amount of annual snowfall falling in a certain mountain range has a mean of 100 inches, and a standard deviation of 15 inches. Measurements have been taken for hundreds of years. Suppose that the snowfall for 50 randomly selected years has been collected. What is the probability that the annual snowfall is less than 95 inches?

When do you use the Central Limit Theorem?

Use the Central Limit Theorem when a question asks you to calculate a probability about an average or mean.

	<p>Solve the problem.</p> <p>9. Packages received by a parcel service have a mean weight of 12.3 pounds with a standard deviation of 3.2 pounds. On one particular day, the parcel service receives 38 packages. What value represents the top 10% mean weight of these 38 packages?</p>
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CHAPTER 19 REVIEW: CONFIDENCE INTERVALS FOR PROPORTIONS

<p>How to create a Confidence Interval</p> <ol style="list-style-type: none"> 1. Identify the population of interest and define the parameter of interest being estimated. 2. Identify the appropriate confidence interval by name or formula. 3. Verify any conditions (assumptions) that need to be met for that confidence interval. 4. Calculate the confidence interval. 5. Interpret the interval in the context of the situation. <p>Write the general Formula for a Confidence Interval</p> <p>Confidence Interval Conditions for Proportions:</p> <ol style="list-style-type: none"> 1. The sample is a simple random sample. 2. The population is large relative to the sample. $10n < N$ (N = the size of the population) 3. The sampling distribution of the sample proportion is approximately normal. $np \geq 10$ and $n(p-1) \geq 10$ 	<p>Find the margin of error for the given confidence interval.</p> <p>10. A recent poll of 2000 new home buyers found that 65% hired a moving company to help them move to their new home. Find the margin of error for this poll if we want 99% confidence in our estimate of the percent of new home buyers who hired movers.</p> <p>Use the given degree of confidence and sample data to construct a confidence interval for the population proportion. You must: identify the parameter, check the assumptions, show the formula, AND interpret the interval.</p> <p>11. Of 120 adults selected randomly from one town, 96 have health insurance. Construct a 90% confidence interval for the percentage of all adults in the town who have health insurance.</p> <p>12. Of 400 randomly selected medical students, 240 said that they planned to work in a rural community. Construct a 95% confidence interval for the percentage of all medical students who plan to work in a rural community</p> <p>Solve the problem.</p>
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13. A political action committee is interested in finding out what kind of popular support they might expect on an environmental initiative. Similar issues have gotten 94% support. The committee will set up a polling program to assure 95% confidence that the margin of error is less than 4%. What sample size will suffice?

14. A pollster wishes to estimate the true proportion of U.S. voters who oppose capital punishment. How many voters should be surveyed in order to be 95% confident that the true proportion is estimated to within 3%?

What confidence level did the pollsters use?

15. A newspaper reports that the governor's approval rating stands at 60%. The article adds that the poll is based on a random sample of 2,547 adults and has a margin of error of 2.5%.

16. A national study reported that 82% of high school graduates pursue a college education immediately after graduation. A researcher checks the validity of this claim with a sample size of 100 and a margin of error within 6.32%.

Find the appropriate sample size.

17. We have calculated a confidence interval based on a sample of $n = 180$. Now we want to get a better estimate with a margin of error only one third as large. We need a new sample with n at least...

Multiple Choice Practice!

18. We have calculated a 95% confidence interval and would prefer for our next confidence interval to have a smaller margin of error without losing any confidence. In order to do this, we can

- I. change the z^* value to a smaller number.
- II. take a larger sample.
- III. take a smaller sample.

A) III only **B)** I only **C)** I and II **D)** II only **E)** I and III

19. Which of the following describe how the sampling distribution model for the sample mean changes as the sample size is increased?

- I: The sampling distribution model becomes more Normal in shape
- II: The standard deviation of the sampling distribution gets smaller
- III: The mean of the sampling distribution gets smaller

A) I and II **B)** I, II, and III **C)** II only **D)** II and III **E)** I only

20. The number of hours a light burns before failing varies from bulb to bulb. The distribution of burnout times is strongly skewed to the right. The central limit theorem says that...

- A)** as we look at more and more bulbs, their mean burnout time gets ever closer to the mean for all bulbs of this type
- B)** the mean burnout time for any number of bulbs has a distribution of the same shape (strongly skewed) as the distribution for individual bulbs
- C)** the mean burnout time for any number of bulbs has a distribution that is close to Normal
- D)** the mean burnout time for a large number of bulbs has a distribution of the same shape (strongly skewed) as the distribution for individual bulbs
- E)** the mean burnout time for a large number of bulbs has a distribution that is close to Normal

21. The chipmunk population, without Alvin, in a certain area is known to have a mean weight of 84 gm and a standard deviation of 18 gm. A wildlife biologist weight 9 chipmunks that have been caught in traps before releasing them unharmed. Which of the following best describes what we know about the sampling distribution of means for the biologist's sample?

- A)** $\mu_{\bar{x}} = 84$; $\sigma_{\bar{x}} = 18$; distribution approximately Normal
- B)** $\mu_{\bar{x}} = 84$; $\sigma_{\bar{x}} = 6$; shape of distribution unknown
- C)** $\mu_{\bar{x}} = 84$; $\sigma_{\bar{x}} = 6$; distribution approximately Normal
- D)** $\mu_{\bar{x}} = 84$; $\sigma_{\bar{x}}$ unknown; distribution approximately Normal
- E)** $\mu_{\bar{x}} = 84$; $\sigma_{\bar{x}}$ unknown; shape of distribution unknown

22. Interpupillary distance (IPD) is the distance between the centers of the pupils of a person's left and right eyes. In male adults IPD is approximately Normal with a mean of 62.5mm and a standard deviation of 6 mm. Suppose you randomly select 5 adult males. What is the probability that their mean IPD is greater than 60 mm?

- (a) $P\left(z > \frac{60-62.5}{6}\right)$ (b) $P\left(z > \frac{62.5-60}{6}\right)$ (c) $P\left(z > \frac{60-62.5}{\frac{6}{\sqrt{5}}}\right)$
 (d) $P\left(z < \frac{60-62.5}{\frac{6}{\sqrt{5}}}\right)$ (e) $P\left(z > \frac{62.5-60}{\frac{6}{\sqrt{5}}}\right)$

23. A survey asks a random sample of 500 adults in Ohio if they support an increase in the state sales tax from 5% to 6%, with an additional revenue going to education. Suppose that 53% of *all* adults in Ohio support the increase. What is the probability that less than half the sample will say they support the increase?

- (a) $P\left(z < \frac{0.5-0.53}{\sqrt{(0.5)(0.5)(500)}}\right)$ (b) $P\left(z > \frac{0.5-0.53}{\sqrt{(0.53)(0.47)(500)}}\right)$
 (c) $P\left(z > \frac{0.53-0.5}{\sqrt{\frac{(0.5)(0.5)}{500}}}\right)$ (d) $P\left(z < \frac{0.5-0.53}{\sqrt{\frac{(0.53)(0.47)}{500}}}\right)$ (e) $P\left(z > \frac{0.5-0.53}{\sqrt{\frac{(0.53)(0.47)}{500}}}\right)$

24. How large of a random sample is required to insure that the margin of error is 0.08 when estimating the proportion of college professors that read science fiction novels with 95% confidence?

- (A) 600
 (B) 300
 (C) 150
 (D) 75
 (E) 25

25. A researcher plans to use a random sample of $n = 500$ families to estimate the mean monthly family income for a large population. A 99% confidence interval based on the sample would be _____ than a 90% confidence interval.

- (A) narrower and would involve a larger risk being incorrect.
 (B) wider and would involve a smaller risk of being incorrect
 (C) narrower and would involve a smaller risk of being incorrect
 (D) wider and would involve a larger risk of being correct
 (E) wider, but it cannot be determined whether the risk of being incorrect would be larger or smaller

Write down quick ideas/facts you want to review right before the test. Now it's in one place :)