Ch. 7 Review Sheet

Binomial Distrib.	Sample Proportion for sample size n	Sample Mean for sample size n
$\mu_x = np$	$\mu_{\hat{p}} = p$	$\mu_{\overline{x}} = \mu$
$\sigma_x = \sqrt{np(1-p)}$	$\sigma_{\hat{p}} = \sqrt{\frac{p(1-p)}{n}}$	$\sigma_{\overline{x}} = \frac{\sigma}{\sqrt{n}}$

1. A SRS of 100 high school seniors in Minneapolis reveals that 65% of them have part-time jobs in addition to school. If the expected value of this proportion is equal to the proportion of all Minneapolis high school seniors who have part-time jobs, then we say that the sample proportion is:
   (a) A true value.
   (b) An unbiased estimator of the population proportion.
   (c) Equal to the population proportion.
   (d) An estimate whose variance equals the variance of data in the population.
   (e) Less than the population proportion since only 100 students were sampled.

2. The number of goals scored per game in a full season of soccer games for a professional league is strongly skewed to the right with a mean of 2.3. Thirty games are randomly selected and the mean number of goals scored in those games is computed. Which of the following best describes the shape of the sampling distribution?
   (a) Skewed to the right with a mean of 2.3 goals
   (b) Skewed to the right with a mean of 2.3/√30 goals
   (c) Normally distributed with a mean of 2.3 goals
   (d) Normally distributed with a mean of 2.3/√30 goals
   (e) Approximately normally distributed with a mean of 2.3 goals

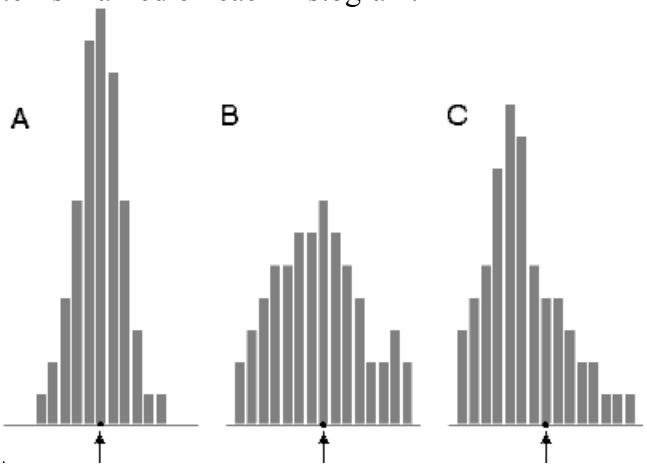
3. Which of the following statements regarding the sampling distribution of sample means is incorrect?
   (a) The sampling distribution is normal when the population is normal and approximately normal when the population is not normal but the sample size is sufficiently large
   (b) The mean of the sampling distribution is the mean of the population
   (c) The standard deviation of the sampling distribution is the standard deviation of the population
   (d) The sampling distribution is found by taking repeated samples of the same size from the population of interest and computing the mean of each sample
   (e) All of these are correct

4. The Central Limit Theorem for a sample mean is a critical result because
   (a) it states that for large sample sizes, the population distribution is approximately normal.
   (b) it states that for large sample sizes, the sample is approximately normal.
   (c) it states that for any population, the sampling distribution is normal regardless of sample size.
   (d) it states that for large sample sizes, the sampling distribution is approximately normal regardless of the population distribution.
   (e) it states that for any sample size, the sampling distribution is normal.

5. Classify each underlined number as a parameter or statistic and give the appropriate notation for each.

   A 1993 survey conducted by the *Richmond Times-Dispatch* one week before Election Day asked voters which candidate for the state's Attorney General they would vote for. Thirty-seven percent of the respondents said they would vote for the Democratic candidate. On Election Day, 41% actually voted for the Democratic candidate.

Use the following for #6-8: Below are histograms of the values taken by three sample statistics in several hundred samples from the same population. The true value of the population parameter is marked on each histogram.



6. Which statistic has the largest bias among these three? Justify your answer.

7. Which statistic has the lowest variability among these three?

8. Based on the performance of the three statistics in many samples, which is preferred as an estimate of the parameter? Why?

9. The number of students at Southwest is approximately 1900, the number at North is 500, and Washburn has approximately 1600 students. A SRS of students is taken at all three schools. At Southwest the sample is 5% of the student body, while the samples at North and Washburn consist of 8% of all students at those schools. Which sample(s) will have the least sampling variability? Explain.

Use the following for #10-13: Suppose that a particular candidate for public office is favored by 48% of all registered voters in Minneapolis. A polling organization takes a random sample of 500 voters.

10. What are the mean and standard deviation of the sample proportion of registered voters who support the candidate?

11. Why is it appropriate to use the formula for standard deviation here?

12. Describe the shape of the sampling distribution of the sample proportion of registered voters who support the candidate. Justify your answer.

13. Find the probability that between 47% and 49% of the registered voters in the sample favor the candidate.

Use the following for #14-16: A study found that the time it takes a fifth-grade student to read a certain passage has a mean of 2 minutes and a standard deviation of 0.8 minutes.

14. Describe the sampling distribution of the average number of minutes it takes a SRS of 100 students to read the passage, including its shape, center, and spread. Justify all the parts of your answer.

15. Calculate the probability that the average number of minutes it takes a random sample of 100 students to read the passage is more than 2.1 minutes.

16. Is it possible to find the probability that it takes a single randomly selected student more than 2.1 minutes to read the passage? If so, do it. If not, explain why it cannot be done.

Chapter 7 Learning Targets:

__ I can explain the difference between a parameter and a statistic and can determine whether a number in a problem is a parameter or a statistic.

__ I can recognize and use the symbols for population and sample mean; population and sample proportion; and population and standard deviation. When given one of these numbers in a problem, I can determine the correct symbol for it.

__ I can differentiate between means and proportions in problems.

__ I can give my own definition for a sampling distribution.

__ I can describe what an unbiased statistic is.

__ I can explain what the effect of the sample size is on the variability of a statistic.

__ I can find the mean and standard deviation of $\hat{p}$ and can describe what these numbers measure.

__ I can explain when the sampling distribution of $\hat{p}$ will be approximately Normal.

__ I can use the Normal approximation to calculate probabilities involving $\hat{p}$.

__ I can find the mean and standard deviation of $\bar{x}$ and describe what these numbers measure.

__ I can explain when the sampling distribution of $\bar{x}$ will be exactly normal (p. 517) and when it will be approximately normal (p. 521).

__ I can calculate Normal probabilities involving $\bar{x}$.

__ I can describe the Central Limit Theorem and use it to solve problems.