AP Statistics Packets 6 – 10

Packet 6:

1. Read through Section 7.3 notes and look over examples on pages 468 – 478 in textbook
2. Watch the following videos: ***They are not examples from your book (ignore page numbers), but walks you through examples very similar.

   https://www.youtube.com/watch?v=8-ur-VmCCWU

   https://www.youtube.com/watch?v=PMeSzK7tybU

Packet 7:

1. Complete the following problems on textbook page 479 – 481 problems 54, 58, and 64

Packet 8:

1. 7.3 Worksheet

Packet 9:

1. Chapter 7 Multiple Choice

Packet 10:

1. Complete the Chapter 7 Practice Test in the textbook page 486 - 487

7.3 Sample Means

Sampling Distribution of the Sample Mean:
describes the distribution of values taken by the sample mean $\bar{x}$ in all possible samples of the same size from the same population

Mean: $\mu_{\bar{x}} = \mu$

SD: $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$ if 10% condition satisfied $n < 0.10N$

Example pg. 470

Example pg. 472-473

Check Your Understanding pg. 474

① normalcdf(270, 1000, 266, 16) = 0.4012937256

② μ = 266 days

③ $6 \leq N$

$\frac{16}{\sqrt{6}} = 6.531972647$

④ normalcdf(270, 1000, 266, 6.532) = 0.270146478

7.3 Notes Continued

Central Limit Theorem: (CLT) says when n is large, sampling distribution of the sample mean $\bar{x}$ is approximately Normal

↳ ① If population distribution is Normal, sampling distribution of $\bar{x}$ will also be Normal

② If population distribution is not Normal, sampling distribution of $\bar{x}$ will be approximately Normal when sample size is large ($n \geq 30$ in most cases)

Example pg. 477-478

pg. 479-481

54, 56, 58, 60, 64, 66, 70

{54, 58, 64}

Packet 8

7.3 WS

Buy Me Some Peanuts and Sample Means

1. At the P. Nutty Peanut Company, dry roasted, shelled peanuts are placed in jars by a machine. The distribution of weights in the bottles is approximately Normal, with a mean of 16.1 ounces and a standard deviation of 0.15 ounces.

(a) Without doing any calculations, explain which outcome is more likely, randomly selecting a single jar and finding the contents to weigh less than 16 ounces or randomly selecting 10 jars and finding the average contents to weigh less than 16 ounces.

(b) Find the probability of each event described above. Since the distribution is normal you can use "normalcdf" on your calculator.

Single jar weighing 16 oz or less:

10 jars weighing 16 oz or less:

Packet 8 Continued

Mean Texts

2. Suppose that the number of texts sent during a typical day by a randomly selected high school student follows a right-skewed distribution with a mean of 15 and a standard deviation of 35. Assuming that students at your school are typical texters, how likely is it that a random sample of 50 students will have sent more than a total of 1000 texts in the last 24 hours?

Bad carpet

3. The number of flaws per square yard in a type of carpet material varies with mean 1.6 flaws per square yard and standard deviation 1.2 flaws per square yard. The population distribution cannot be Normal, because a count takes only whole-number values. An inspector studies 200 square yards of the material, records the number of flaws found in each square yard, and calculates X, the mean number of flaws per square yard inspected. Find the probability that the mean number of flaws exceeds 2 per square yard.

Packet 9

Ch. 7 MC Practice **Name:**_____

1. A newspaper poll reported that 73% of respondents liked business tycoon Donald Trump. The number 73% is

(a) a population. **(b)** a parameter. **(c)** a sample.

(d) a statistic. **(e)** an unbiased estimator.

2. The name for the pattern of values that a statistic takes when we sample repeatedly from the same population is

(a) the bias of the statistic. **(b)** the variability of the statistic. **(c)** the population distribution.

(d) the distribution of sample data. **(e)** the sampling distribution of the statistic.

4. Increasing the sample size of an opinion poll will

(a) reduce the bias of the poll result. **(b)** reduce the variability of the poll result.

(c) reduce the effect of nonresponse on the poll. **(d)** reduce the variability of opinions.

(e) all of the above.

Select the best answer for Exercises 5 to 8, which refer to the following setting. The magazine Sports Illustrated asked a random sample of 750 Division I college athletes, "Do you believe performance-enhancing drugs are a problem in college sports?" Suppose that 30% of all Division I athletes think that these drugs are a problem. Let ôop be the sample proportion who say that these drugs are a problem.

5. The sampling distribution of $\hat{p}$ has mean

(a) 225 **(b)** 0.30. **(c)** 0.017. **(d)** 0. **(e)** none of these.

6. The standard deviation of the sampling distribution is about

(a) 0.0006 **(b)** 0.033. **(c)** 0.017. **(d)** 1. **(e)** none of these.

8. The sampling distribution of $\hat{p}$ is approximately Normal because

(a) there are at least 7570 Division I college athletes. **(b)** np = 225 and n(1 – p) = 525.

(c) a random sample was chosen. **(d)** a large sample size like n = 750 guarantees it.

(e) the sampling distribution of $\hat{p}$ always has this shape.

Packet 9 Continued

Exercises 9 and 10 refer to the following setting. Scores on the mathematics part of the SAT exam in a recent year were roughly Normal with mean 515 and standard deviation 114. You choose an SRS of 100 students and average their SAT Math scores. Suppose that you do this many, many times.

9. The mean of the average scores you get should be close to

(a) 515. **(b)** 515/100 = 5.15. **(c)** $515/\sqrt{100}$ =51.5 **(d)** 0. **(e)** none of these.

10. The standard deviation of the average scores you get should be close to

(a) 114. **(b)** 114/100 = 1.14. **(c)** $114/\sqrt{100}$ =11.4 **(d)** 1. **(e)** none of these.

12. The number of hours a light bulb 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 average burnout time gets ever closer to the mean μ for all bulbs of this type.

(b) the average burnout time of a large number of bulbs has a distribution of the same shape (strongly skewed) as the population distribution.

(c) the average burnout time of a large number of bulbs has a distribution with similar shape but not as extreme (skewed, but not as strongly) as the population distribution.

(d) the average burnout time of a large number of bulbs has a distribution that is close to Normal.

(e) the average burnout time of a large number of bulbs has a distribution that is exactly Normal.

13. A study of voting chose 663 registered voters at random shortly after an election. Of these, 72% said they had voted in the election. Election records show that only 56% of registered voters voted in the election. Which of the following statements is true about the boldface numbers?

(a) 72% is a sample; 56% is a population.

(b) 72% and 56% are both statistics.

(c) 72% is a statistic and 56% is a parameter.

(d) 72% is a parameter and 56% is a statistic.

(e) 72% and 56% are both parameters.

14. The Gallup Poll has decided to increase the size of its random sample of voters from about 1500 people to about 4000 people right before an election. The poll is designed to estimate the proportion of voters who favor a new law banning smoking in public buildings. The effect of this increase is to

(a) reduce the bias of the estimate.

(b) increase the bias of the estimate.

(c) reduce the variability of the estimate.

(d) increase the variability of the estimate.

Packet 9 Continued

16. The central limit theorem is important in statistics because it allows us to use the Normal distribution to make inferences concerning the population mean

(a) if the sample size is reasonably large (for any population).

(b) if the population is Normally distributed and the sample size is reasonably large.

(c) if the population is Normally distributed (for any sample size).

(d) if the population is Normally distributed and the population variance is known (for any sample size).

(e) if the population size is reasonably large (whether the population distribution is known or not).

17. The number of undergraduates at Johns Hopkins University is approximately 2000, while the number at Ohio State University is approximately 40,000. At both schools, a simple random sample of about 3% of the undergraduates is taken. Each sample is used to estimate the proportion p of all students at that university who own an iPod. Suppose that, in fact, $p = 0.80$ at both schools. Which of the following is the best conclusion?

(a) The estimate from Johns Hopkins has less sampling variability than that from Ohio State.

(b) The estimate from Johns Hopkins has more sampling variability than that from Ohio State.

(c) The two estimates have about the same amount of sampling variability.

(d) It is impossible to make any statement about the sampling variability of the two estimates since the students surveyed were different.

(e) None of the above.

19. The student newspaper at a large university asks an SRS of 250 undergraduates, "Do you favor eliminating the carnival from the term-end celebration?" All in all, 150 of the 250 are in favor. Suppose that (unknown to you) 55% of all undergraduates favor eliminating the carnival. If you took a very large number of SRSs of size $n = 250$ from this population, the sampling distribution of the sample proportion $\hat{o}op$ would be

(a) exactly Normal with mean 0.55 and standard deviation 0.03.

(b) approximately Normal with mean 0.55 and standard deviation 0.03.

(c) exactly Normal with mean 0.60 and standard deviation 0.03.

(d) approximately Normal with mean 0.60 and standard deviation 0.03.

(e) heavily skewed with mean 0.55 and standard deviation 0.03.

Packet 9 Continued

21. A machine is designed to fill 16-ounce bottles of shampoo. When the machine is working properly, the mean amount poured into the bottles is 16.05 ounces with a standard deviation of 0.1 ounce. Assume that the machine is working properly. If four bottles are randomly selected each hour and the number of ounces in each bottle is measured, then 95% of the observations should occur in which interval?

(a) 16.05 to 16.15 ounces

(b) −0.30 to +0.30 ounces

(c) 15.95 to 16.15 ounces

(d) 15.90 to 16.20 ounces

(e) None of the above