Name: **Class Number:**

Math 54 Exam 3
Fall 2017

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Problem 1. Assume that x is a random variable which is normally distributed with mean 2 and standard deviation 4 (nonstandard normal). Find $P(-2 < x < 4)$. Write your answer using 4 deciml places.

Problem 2. Assume women's heights are normally distributed with a mean of 63.6 in. and standard deviation 2.5 in. Find the percentage of women between 59 in. and 69 in.. Write your answer using 4 deciml places.

Problem 3. Suppose we have obtain samples of a normal distribution and then compute the mean of the samples. The normal distribution we got the data from has a mean of 4 and standard deviation of 5. Our sample size is 50. What will be the standard deviation of the mean of the samples? Write your answer using 3 deciml places.

Problem 4. The amount of snowfall falling in a certain mountain range is normally distributed with a mean of 40 inches and a standard deviation of 16 inches. Suppose we look at the amount of snowfall during 50 randomly picked years and average the results (we compute the mean). Find the probability that the mean snowfall of these 50 randomly picked years will exceed 40 inches. Write your answer using 4 deciml places.

Problem 5. Suppose that we are going to conduct a poll and want the margin of error to be 0.03 (3%). We want a 90% confidence level. An estimate for $\hat{p}$ is unavailable. How many people to we need to survey in the poll?

Problem 6. When 500 college students are randomly selected and surveyed it is found that 320 like a certain product. Find a 95% confidence interval for the true proportion of all college students who like the product. Write each of your numbers using 3 decimal places.

Problem 7. The average starting salary for college graduates who have taken a certain class is $\bar{x} = \$51,300$ based on $n = 50$ samples. Suppose that the population is normally distributed with $\sigma = \$7500$. Find the critical value for the 95% confidence interval for the true mean μ of the average salaries. Write each of your numbers using 2 decimal places.

Problem 8. The average starting salary for college graduates who have taken a certain class is $\bar{x} = \$51,300$ based on $n = 50$ samples. Suppose that the population is normally distributed with $\sigma = \$6800$. Find the margin of error for the 95% confidence interval for the true mean μ of the average salaries. Round your answer to the nearest integer.

Problem 9. The average starting salary for college graduates who have taken a certain class is $\bar{x} = \$48,000$ based on $n = 30$ samples. Suppose that the population is normally distributed. The population sigma is not known but the estimated sigma is $s = \$1000$. Find the critical value for $\alpha = 0.01$ that can be used for a confidence interval. Write your answer using 3 decimal places.

Problem 10. The average starting salary for college graduates who have taken a certain class is $\bar{x} = \$48,000$ based on $n = 30$ samples. Suppose that the population is normally distributed. The population sigma is not known but the estimated sigma is $s = \$1000$. Find the margin of error for $\alpha = 0.01$. Round your answer to the nearest integer.

Problem 11. The average starting salary for college graduates who have taken a certain class is $\bar{x} = \$45,000$ based on $n = 32$ samples. Suppose that the population is normally distributed. The population sigma is not known but the estimated sigma is $s = \$1000$. Find the 95% confidence interval for the true mean μ of the average salaries. Round each of your numbers to the nearest integer.

Problem 12. A certain confidence interval for a mean is given by $(65, 85)$. Find the margin of error.

Problem 13. In a certain political poll based on 1200 data points the number of people who preferred candidate A is 650. If we define *success* as preferring candidate A then find $\hat{p}$. Write your answer using 2 decimal places.

Problem 14. In a political poll if we want to make the confidence interval smaller should we increase or decrease the sample size assuming other parameters remain the same?

Problem 15. Suppose 25 bags of chocolate chip cookies were examined and it was found that the mean number of chocolate chips in each cookie was 24 with a standard deviation of 2.52. Construct a 90% confidence interval of the standard deviation of the number of chocolate chips in all such cookies. You may assume the data is normal. Write your answer using 2 decimal places.

Problem 16. Suppose the heights of males in a certain very large class is 69 inches with a standard deviation of 2.5 inches. Find the 95th percentile of the heights of the males in the class. Write your answer using 2 decimal places.

Problem 17. Suppose in a class of 45 students, 10 students are picked at random from the roster and a sample standard deviation of their exam scores is computed. Will this sample standard deviation be a biased or unbiased estimate of the actual standard deviation of the exam scores of the entire class?

Problem 18. Suppose x is a random variable that is uniformly distributed in the interval (0,40). We obtain 25 samples and want to find the probability that the average of these 25 samples exceeds 22.3. Can the central limit theorem be used here? (Yes or No)

Problem 19. What kind of distribution does the random variable $\frac{(n-1)s^2}{\sigma^2}$ have?

Problem 20. Suppose you have constructed a 95% confidence interval for a proportion based on a sample of size n. If you decide you would like a 90% confidence interval for the proportion would the absolute values of your critical values increase or decrease?

Extra workspace. If you use this space and want it graded then reference it from the Problem being worked.