Math 247: Test 3 **Name:_____**
(Wright, Fall 2017)

In-Class Test:_____/ 70 Take Home Test_____/30 Final score _____/100

1. (2 pts) Determine which of the following variables is continuous and which is discrete (circle the answer):

   X = the number of cars not stopping at a stop sign. DISCRETE CONTINUOUS

   X = the weight of a 2-year-old boy DISCRETE CONTINUOUS

2. (2 pts) If you scored right at the top 30% on an exam, which of the following would be true (there may be more than one correct answer…circle the correct answer(s)).

   (a) Your score was at the 30^{th} percentile. (b) Your score was at the 70^{th} percentile.

   (c) You scored a 70% on the exam (d) You scored a 30% on the exam

   (e) You did better than 70% of the other people who took the exam.

3. (9 pts) Blood Cell Count. The distribution of red blood cell (RBC) counts in healthy men is approximately normal, with a mean of 5.1 million cells per microliter and a standard deviation of 0.3 million cells per microliter.

(a) Sketch a normal curve showing the distribution of RBC's . Incude the z-axis, and tick marks based on standard deviations.

(b) Shade the region that represents the percentage of healthy men with RBC count above 5.4 million cells per microliter.

(c) Which of the following is the best estimate of this percentage? (Circle the best answer)

   (i) 50% (ii) 68% (iii) 16% (iv) 32%

4. (3 pts) If you walked around campus and asked various students whether they support stricter gun control laws, would you be obtaining a random sample? Why or why not?

5. (2 pts) Suppose you wanted to find out the proportion of students who read for enjoyment on a regular basis. If you polled students in a Creative Writing class is it likely the the results would be biased? If yes, what kind of bias could there be, positive or negative?

   Bias? YES NO

   IF Biased, it it POSITIVE or NEGATIVE?

6. (2 pts) Statistical inference includes which of the following (circle the correct answer):

   (a) Using a sample to prove that something is true about a population with 100% certainty

   (b) Using a sample to prove that something is false about a population with 100% certainty

   (c) Using a sample statistic to estimate a population parameter with a level of confidence that is always less than 100%.

   (d) Using a sample to prove something about the sample.

7. (6 pts) Suppose in conducting a study, you've done everything correctly in gathering data, in doing the analysis via hypothesis testing, then in forming a conclusion based on the P-value.

   There is still the possibility, due to _____, that the evidence led you to a conclusion that is incorrect.

If the evidence led you to reject the null hypothesis, you could have made a _____ error.

If the evidence led you to not reject the null hypothesis, you could have made a _____ error.

8. (2 pts) A poll on a proposition showed that we are 95% confidence that the proportion of all voters supporting it is between 40% and 48%.

   (a) What proportion of the <u>sample</u> supported the proposition? _____

   (b) What is the margin of error? _____

9. (3 pts) A 2011 Harris poll asked registered voters to rate how happy they were in their lives. The poll report included the following statement: " As has been the trend, men seem to be getting less happy, as 31% are very happy this year (2011), down from 32% last year (2010)."

   The margin of error for the percentages is +/- 4%, with a 95% level of confidence.

Does this poll actually show that there was a decrease in the proportion of "very happy" men in the entire population? Explain, based just on the percentages and margin of error; i.e,, assume the poll was done well, with random sampling, etc.

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10. (12 pts) An e-commerce research company claims that 60% of people who click on a particular ad eventually buy the item. Suppose a random sample of 200 people who clicked on the ad is taken and 92 of them went on to buy the item.

    (a) Find the 95% confidence interval for the population proportion of California residents who think community college should be free. z* values are provided.

Confidence Level	z*
80%	1.282
90%	1.645
95%	1.960
99%	2.576

    (b) Interpret the confidence interval from (a) in the context of the problem.

    (c) Does the confidence interval support or not support the claim of the e-commerce research company? Briefly explain.

11. (3 pts) What is a P-value?

12. (2 pts) What is the relationship between the P-value for a one-tailed test and the P-value for a two-tailed test, assuming you are using the same hypotheses and data?

13. (2 pts) What is the "default" significance level that is most often used in hypothesis tests? _____

14. (4 pts What are the 4 steps of hypothesis testing? You can use one word for each step (no explanation required).

15. (16 pts) The mother of a teenager has heard a claim that 25% of high school teenagers who drive reported that they sometimes text while driving. She thinks the rate is too low and wants to test the hypothesis that more than 25% of high school teens have texted while driving. She polls 40 randomly selected teenagers at the local high school and 16 of them report having texted while driving.

Perform all steps of a hypothesis test to see whether the evidence she gathered supports her belief that more than 25% of teenager drive and text.

(a) What would the null and alternative hypotheses be for the Hypothesis Test? Write the hypotheses in symbols and also in words.

(b) Name the test you will use and check whether the conditions for this test are satisfied. No explanations needed on the check but show computational work!

(c) Show all computation up to finding the P-value. For full credit, include a sketch and shade in the area that represents the P-value.

(d) Using technology, the P-value for the test would be .0142. Finish the Hypothesis Test using this information.

Math 247: Test 3 (Take Home) **Name:_____**
(30 points)

In-Class Test_____/70 *Take-Home Test_____/30* *Total _____/100*

- *This exam is due <u>at the beginning of class</u> on Tuesday, 11/14/2017. You may work with other people in the class but not with tutors, other instructors, etc. <u>Be sure that all answers are written in your own words</u>; i.e., do not write verbatim the same answer as another student.*

- *Your work can be typed or NEATLY handwritten.*

- *Your work should incorporate all of the technology work mentioned below; i.e., copy and paste the technology results into your write-up.*

Scoring will be based on organization of your work, accuracy, and thoughtful, well-written answers.

Answer all of the following questions on another piece of paper and attach to this cover sheet. Use complete sentences in your answers!

The following is an excerpt from a report by the National Institute of Alcohol Abuse and Alcoholism:

"Harmful and underage college drinking are significant public health problems, and they exact an enormous toll on the intellectual and social lives of students on campuses across the United States. Drinking at college has become a ritual that students often see as an integral part of their higher education experience. Many students come to college with established drinking habits, and the college environment can exacerbate the problem. According to a national survey conducted by the NIH, almost 60 percent of college students ages 18–22 drank alcohol in the past month,[1] and almost 2 out of 3 of them engaged in binge drinking during that same timeframe.[2]"
(https://pubs.niaaa.nih.gov/publications/collegefactsheet/collegefact.htm)

(Note: Two-thirds of 60% is 40% so we will use that figure as the national percentage of college who have engaged in binge drinking.)

You are going to conduct a poll to see whether the proportion of students at Cuesta who have engaged in binge drinking in the last month is different from the national average of 40% of all college students.

ASSIGNMENT:

(a) Gather data from a sample of 50 Cuesta students (you can share data with 1 other student). Determine how many of the students have engaged in binge drinking (5 or more drinks consumed within a two-hour period) in the last month.

The sample does not have to be a random sample but you will analyze the biases that could have occurred.

Describe the following:

- how you got your sample,
- what questions you asked and how you asked them (verbally, written, Facebook poll, etc.)
- the characteristics of each person sampled: age, gender, major.

Explain what factors might have biased the results of the survey.

(continued on next page)

(b) Conduct a hypothesis test to see whether your sample provides evidence that the proportion of Cuesta students who have engaged in binge drinking is different from the national average.
    - Explain, using sentences, how each of the conditions for the test is or is not satisfied.
    - Complete the test whether or not the conditions have been satisfied.
    - Use a .05 level of significance.
    - Use the Rossmna/Chance applet for the computation step in the hypothesis test and also to find the 95% confidence interval.
    - Include a printout of the applet result with the take home.

(c) Find the confidence interval using the Rossman/Chance applet.
    - Write the confidence interval in both formats (showing Margin of Error, and showing the entire interval).
    - Interpret the confidence interval in the context of the problem

(d) Write a summary paragraph or two, describing challenges in getting your sample, then outlining the results and what it means in terms of binge drinking by Cuesta students. Include observations about the students in your sample (age, gender, major) and at least one other possible confounding factor.