Math 247: Test 3 (Wright, Fall 2019)   **Name**:_____

In-Class Test:_____/ 100   **Class Time:** _____

1. (3 pts) Determine which of the following variables is continuous and which is discrete (circle the answer):

  X = the number you get when you roll a die.   .   DISCRETE   CONTINUOUS

  X = the temperature of a healthy woman   DISCRETE   CONTINUOUS

2. (8 pts) Suppose you roll a six-sided die. Let X = the number of spots showing.

  Make a table and a graph for the probability distribution of X.

X = number of spots	
P(x)	

  Graph:

3. (8 pts) Suppose you conducted a survey by walking around campus and asking 50 students whether they support free community college.

(a) Would this be a random sample of Cuesta students? <u>Explain</u> why it is, or is not, a random sample.

(b) If you used this as a sample to represent all SLO county residents, would your results likely have…

   positive bias   negative bia   no bias   can't tell

4. (4 pts) If you scored right at the <u>top</u> 3% 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 3rd percentile.   (b) Your score was at the 97th percentile.

  (c) You scored a 97% on the exam   (d) You scored a 3% on the exam

  (e) You did better than 97% of the other people who took the exam.

5. (18 pts) A study of human body temperatures using healthy women showed a mean of 98.4°F and a standard deviation of about 0.70°F. Assume the tempeatures are approximately Normally distributed.

(a) Sketch a normal curve N(98.4, 0.7) showing the distribution of temperatures . Incude the z-axis, and tick marks based on standard deviations.

(b) Shade the region that represents the percentage of healthy women with termperatures between 97.7°F and 99.1°F

(c) Which of the following is the best estimate of this percentage?   (Circle the best answer)
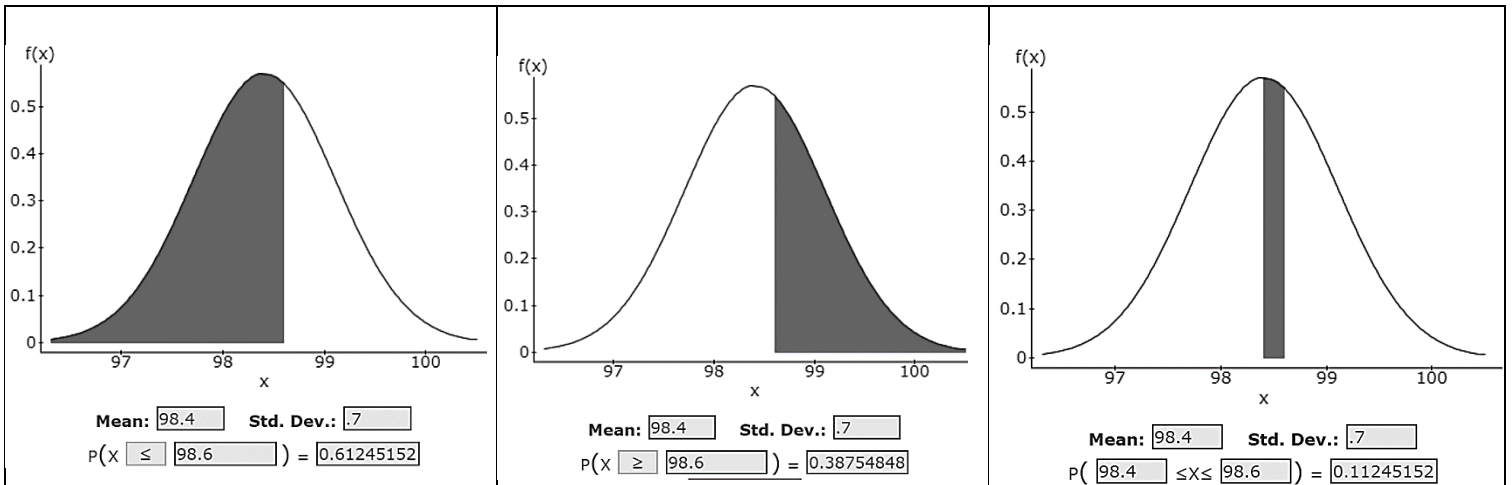
(i) 50%   (ii) 68%   (iii) 16%   (iv) 32%

(d) Find the z-score for a temperature of 97.0°F.

(e) Is this an unusual temperature for a healthy woman to have? Explain how you can tell using the z-score.

(f) Find the probability that a healthy woman would have a temperature of 98.6°F or higher by choosing the appropriate graph below:

Answer: _____

Mean: 98.4   Std. Dev.: .7

P(X ≤ 98.6) = 0.61245152

Mean: 98.4   Std. Dev.: .7

P(X ≥ 98.6) = 0.38754848

Mean: 98.4   Std. Dev.: .7

P(98.4   ≤X≤ 98.6) = 0.11245152

6. (4 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 data from a sample to find out something about a population without ever having 100% certainty of the results.

   (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. (8 pts) What are the 3 conditions that have to be satisfied to be able to use the Central Limit Theorem for propotions?

   1.

   2.

   3.

   This Theorem tells us that the Sampling Distribution of $\hat{p}$ is approximately _____ as long as the conditions are met.

9. (3 pts) What doe a P-value from a hypothesis test tell us?

10. (4 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?

11. (40 pts) A new drug is being proposed for the treatment of migraine headaches. Unfortunately, some users in early tests of the drug reported mild nausea as a side effect. The FDA will reject the drug if significantly more than 10% of the population would suffer from this side effect. To test this, a researcher draws a random sample of 200 people who suffer from migraine headaches and gives them the drug. 26 people in the sample report having nausea.

 Conduct all 4 steps of the hypothesis test to see whether the data provides evidence that more than 10% of all potetial users will experience nausea from this drug. Use a significance level of .05.

Step 1:_____
(For full credit, write hypotheses using <u>words</u> and <u>symbols</u>)

Step 2:_____
(For full credit, include what a "success" is and what the population is in this problem.)

Step 3:_____

For full credit on this step, do all <u>work by hand,</u> up to finding the P-value. Include a sketch of the sampling distribution for $\hat{p}$. Show your work in finding the test-statistic.   Shade in the area that represents the P-value.

Output from StatCrunch for reference.

Hypothesis test results:

Proportion	Count	Total	Sample Prop.	Std. Err.	Z-Stat	P-value
p	26	200	0.13	0.021213203	1.4142136	0.0786

Step 4:_____

Follow up: Based on the evidence, will the FDA reject the drug or cautiously accept the drug? Explain your reasoning.