Unit Exam #2

Statistics 300: Introduction to Probability and Statistics

Spring Semester 2011
Cosumnes College

Instructor: L.C. Larsen

Instructions

Time: 2 hours & 5 minutes on 3/25, 3/28, or 3/29, 2011

Materials: Open book, notes, homework, etc.

Instruments: Calculator/Laptop of student's choice

No phones or consultants
Except to call the instructor : 346-6324 or 322-3988

Answers to confidence interval problems and sample size problems must include the expression (the formula) in symbolic form and the expression with all of the values inserted in the proper places. Then, the final answer can be calculated by any method or device.

Answers to hypothesis test problems must include all four parts of the traditional approach to hypothesis tests, including the expression (the formula) for the test statistic in symbolic form and the expression with the values in the right places. The result can then be calculated by whatever method you like (TI-83, laptop computer, etc.).

If more space is needed for a problem, continue your work on the back of the page.

Statistics 300 **Name:** ____________________ **Spring 2011**
Instructor: Lawrence C. Larsen **Tue./Thu. 7:00 - 9:05 p.m.**

Exam #2

(6 points; 6 minutes)

1. **You are part of a team designing an experiment. The goal is to estimate the percent of young Black men in the state that plan to attend college. If the team wants to have 95% confidence that the percent in the study will be within 4 percentage points of the actual percent in the state, how big should the sample be for the experiment? Ten years ago, a similar study found that 30% planned to attend college, but now the percentage is thought to be somewhat lower.**

(7 points; 6 minutes)

2. **Weights of text books for statistics weigh an average of 4.3 pounds and have a standard deviation of 0.4 pounds. The distribution of their weights is bell-shaped. If a random sample of 15 statistics text books is collected, what is the probability that their average weight will be greater than 4.5 pounds ?**

Picture goes here (2 points)

(6 points; 6 minutes)

3. **Given: X is a random variable, and X ~ N(μ = 130, σ = 28). What is the probability that a random value of X will be between 92 and 113 ?**

(7 points; 7 minutes)

4. **Use the information in the table to make a 98% confidence interval for the proportion of all women older than 40 that have been married more than one time. The data in the table are from a random sample of 1179 women.**

	Number of times married			
Age	**0**	**1**	**>1**	**Total**
< 30	**78**	**274**	**39**	**391**
30 to 40	**69**	**324**	**70**	**463**
> 40	**49**	**228**	**48**	**325**
Total	**196**	**826**	**157**	**1179**

(5 points; 6 minutes)

5. What is the value of the 87^{th} percentile (P_{87}) of the Normal distribution that has a mean of 63.2 and a standard deviation of 19.7 ?

Picture goes here (2 points)

(4 points; 5 minutes)

6. What is the probability that three (3) random values from a population [X ~ N(100,30)] will all be greater than the 80^{th} percentile (P_{80}) ?

(8 points; 8 minutes)

7. Use the data in the table below for a random sample of 1179 women to test the claim that more than 75% of women that get married do so once for life. The relevant data in the table are "shaded".

	Number of times married			
Age	**0**	**1**	**>1**	**Total**
< 30	**78**	**274**	**39**	**391**
30 to 40	**69**	**324**	**70**	**463**
> 40	**49**	**228**	**48**	**325**
Total	**196**	**826**	**157**	**1179**

Claim: ______________________

H_0: ______________________

H_1: ______________________

(7 points; 7 minutes)

8. The quality control manual at a coffee shop says that the regular coffee it serves should have temperatures with a mean of 145° C and a standard deviation of 2° C or less. The temperatures form a population that is bell-shaped. Use the results for a random sample of 20 cups of their regular coffee to test the claim of the regional manager that the shop is failing to meet the goal for temperature variability.

Results for Sample	
n =	**20**
$\bar{x}$ **=**	**144.7**
s =	**2.6**

Claim: ______________________

H_0: ______________________

H_1: ______________________

(9 points; 9 minutes)

9. Use the random sample of data shown below to construct a 90% confidence interval for the mean of the population from which the sample came. The population is known to be bell-shaped.

Data
132
132
157
191
135
258
301
194
127

Based on your confidence interval, is it reasonable to claim that the mean of the population is less than 240 ? Circle your answer and explain why.

YES **NO** **Why?** ______________________________

____

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(5 points; 5 minutes)

10. The values produced by a random number generator are uniformly distributed between 80 and 120. What is the probability that the next random value it produces will be greater than 106.34 ?

Picture goes here (2 points)

(6 points; 6 minutes)

11. What is the 40^{th} percentile (P_{40}) of the uniform distribution from 213 to 452 ?

Picture goes here (2 points)

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(8 points; 8 minutes)

12. The quality control manual at a coffee shop says that the regular coffee it serves should have temperatures with a mean of 145° C and a standard deviation of 2° C or less. The temperatures form a population that is bell-shaped. Use the results for a random sample of 40 cups of their regular coffee to test the validity of a consumer group's complaint that the regular coffee served at the shop averages at least 7° C hotter than it is supposed to.

Results for Sample	
n =	**40**
$\bar{x}$ **=**	**154.9**
s =	**2.6**

Claim: ______________________

H_0: ______________________

H_1: ______________________

(7 points; 8 minutes)

13. The quality control manual at a coffee shop says that the regular coffee it serves should have temperatures with a mean of 145° C and a standard deviation of 2° C or less. The temperatures form a population that is bell-shaped. Use the results for a random sample of 20 cups of their regular coffee to construct a 95% confidence interval for the standard deviation of the temperatures of all the regular coffee the shop serves.

Results for Sample	
n =	**20**
$\bar{x}$ **=**	**144.7**
s =	**2.6**

Based on your confidence interval, what is the reasonable range for the true standard deviation of the temperatures of all the cups of regular coffee the shop serves ?

reasonable range for sigma = ______________________________

Why? ______________________________

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(7 points; 8 minutes)

14. The federal government wants to know the average amount of money spent on health care by self-employed people that receive no "welfare" of any kind. The government knows it does not have records from the census on this topic, so they want to estimate the average within \$100 with 95% confidence. To do this, how big a random sample of such people should they study ? A major health insurance company has estimated the standard deviation for this population to be \$1,090.