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PART II: Questions 11 - 25, Self select

Fall 2005

Choose TEN out of the next FIFTEEN questions to complete. You must show all your work and clearly indicate your answer for full credit. CROSS OUT the problems that you do not want graded.

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**Find the minimum sample size you should use to assure that your estimate of  $\hat{p}$  will be within the required margin of error around the population  $p$ .**

11) Margin of error: 1%; confidence level: 98%;

A) Assuming that there is no known value for  $\hat{p}$

B) Assuming that a preliminary data set shows that  $\hat{p} = 0.28$

**Test the given claim using the traditional method of hypothesis testing. Assume that the sample has been randomly selected from a population with a normal distribution.**

12) Use a significance level of  $\alpha = 0.01$  to test the claim that  $\mu > 2.85$ . The sample data consists of 9 scores for which  $\bar{x} = 3.2$  and  $s = 0.56$ .

**Explain using complete sentences.**

- 13) A student has a data set in which the smallest value is 83.6 and the largest value is 85.2. When attempting to calculate the standard deviation of this data, the student got the number  $s = 19.58$ . Use complete sentences to explain how the student should know that this standard deviation is incorrect.

**Use the given data to construct a frequency distribution.**

- 14) On a math test, the scores of 24 students were

97 78 71 69 71 71 96 89 71 60 88 78  
78 88 71 78 88 71 78 89 78 88 89 69

Construct a frequency table. Use 4 classes beginning with a lower class limit of 60.

Score	Frequency

**Find the indicated probability.**

- 15) An unprepared student makes random guesses for the ten true–false questions on a quiz. Find the probability that there is at least one correct answer.

**Find the mean, median, mode, and midrange for the given sample data.**

- 16) Six college buddies bought each other Christmas gifts. They spent:  
\$261.12 \$120.52 \$186.23  
\$298.97 \$171.55 \$263.96

Find the following measures of central tendency and round your answer to the nearest cent.

Mean \_\_\_\_\_

Median \_\_\_\_\_

Mode \_\_\_\_\_

Midrange \_\_\_\_\_

**Identify the null hypothesis, alternative hypothesis, test statistic, P-value, conclusion about the null hypothesis, and final conclusion that addresses the original claim.**

- 17) According to a recent newspaper article 53% of Utahns would vote for the incumbent governor. If a random sample of 100 people results in 45% who would vote for the incumbent, test the claim that the actual percentage is 53%. Use a 0.10 significance level.

**Solve the problem.**

- 18) In one region, the September energy consumption levels for single-family homes are found to be normally distributed with a mean of 1050 kWh and a standard deviation of 218 kWh. Find  $P_{45}$ , which is the consumption level separating the bottom 45% from the top 55%.

**Assume that a procedure yields a binomial distribution with a trial repeated  $n$  times. Use the binomial probability formula to find the probability of  $x$  successes given the probability  $p$  of success on a single trial.**

- 19)  $n = 15, x = 4, p = 0.15$

Use the given data to find the equation of the regression line. Round the final values to three significant digits, if necessary.

20) 

x	1.2	1.4	1.6	1.8	2.0
y	54	53	55	54	56

Construct a boxplot for the given data. Include values of the 5-number summary in all boxplots.

21) Construct a boxplot for the data given in the stem-and-leaf plot.

4	3 6 9
5	1 2 2 5 8
6	5 6 6 6 7 7 7 9
7	1 3 5 7 9
8	3 5 6 7

Solve the problem.

22) A company manufactures batteries in batches of 14 and there is a 3% rate of defects. Find the mean and the standard deviation for the number of defects per batch.

**Find the value of the linear correlation coefficient  $r$ .**

- 23) The paired data below consist of the test scores of 6 randomly selected students and the number of hours they studied for the test.

Hours	4	10	4	6	8	9
Score	64	86	69	87	59	93

**Use the given degree of confidence and sample data to construct a confidence interval for the population mean  $\mu$ . Assume that the population has a normal distribution.**

- 24) A laboratory tested twelve chicken eggs and found that the mean amount of cholesterol was 225 milligrams with  $s = 15.4$  milligrams. Construct a 95 percent confidence interval for the true mean cholesterol content of all such eggs.

**Solve the problem.**

- 25) The weights of the fish in a certain lake are normally distributed with a mean of 19 lb and a standard deviation of 12. If 16 fish are randomly selected, what is the probability that the mean weight will be between 16.6 and 22.6 lb?

## Answer Key

Testname: STATSFINALSS-B

11) Using  $z_{\alpha/2} = 2.33$

A) 13,573

B) 10,945

12) Test statistic:  $t = 1.88$ . Critical value:  $t = 2.896$ . Fail to reject  $H_0: \mu = 2.85$ . There is not sufficient evidence to support the claim that the mean is greater than 2.85.

13) Answers may vary. Most notably the range is only 1.6, therefore using the range rule of thumb the standard deviation should be approximately 0.4. A standard deviation of 19.58 is way too large.

14)

Score	Frequency
60 - 69	3
70 - 79	12
80 - 89	7
90 - 99	2

15)  $\frac{1,023}{1,024} \approx 0.999$

16) mean = \$217.06, median = \$223.68, mode: none, midrange = \$209.75

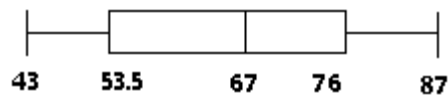
17)  $H_0: p = 0.53$ .  $H_1: p \neq 0.53$ . Test statistic:  $z = -1.60$ . P-value:  $p = 0.0548$ . Fail to reject null hypothesis. There is not sufficient evidence to warrant rejection of the claim that the actual percentage is 53%.

18) 1021.7 kWh using  $z = -0.13$  which corresponds with a probability of .4483. If students choose  $z = -0.12$  (area = .4522) then the answer would be 1023.8 kWh. Either answer would be acceptable.

19) 0.116

20)  $\hat{y} = 50.4 + 2.50x$

21)



22)  $\mu = 0.42$   $\sigma = 0.638$

23)  $r = 0.5173$

24)  $215.2 < \mu < 234.8$ , note that this requires a t-score because  $\sigma$  is unknown and  $n < 30$ .

25) 0.6730