Extracted from Tk20

College level mathematics: 2010 – 2012 Plan

Goal:

Students will demonstrate proficiency in performing tests of hypotheses

Plan Overview:

2011-2012 Annual Goals	
Description	1) Students will identify the null hypothesis, the alternative hypothesis, and determine whether the test is one or two tailed. If the test is one tailed, the student will select left tailed or right tailed. This is the essential first step in a test of hypothesis 2) Students will choose the appropriate test statistic for a given situation, compute the test statistic and select the critical value from the appropriate chart. It is crucial that the students be able to differentiate between the test statistics. 3) Students will write the decision statement and the conclusion for a given test of hypothesis. This is the concluding step in a complete test of hypothesis. Measures:

Measure 1:	The mean score for the students engaged in the task of setting up the null and alternative hypotheses will be 75%
Measure 2:	The mean score for the students engaged in the task of choosing and computing the appropriate test statistics will be 75%
Measure 3:	The mean score for the students engaged in the task of making the final decision and conclusion for a given test of hypothesis will be 75%

Quiz Question 1	Fall 2010	81%
Quiz Question 2	Fall 2010	58%
Quiz Question 3	Fall 2010	56%

Comments: Quizzes on hypothesis testing were administered to 11 sections (256 students) of MAT 150 (Statistics 1) in the fall of 2010.The percentage score for each of the 3 measures (see above) will be reported. Success will be determined if the percentage are at least 75%

Percentage met: 66%

Analysis:

1) Students have demonstrated proficiency in setting up the appropriate null and alternative hypotheses from a given situation. The mastery of this skill is essential in the study of elementary statistics as it represents one of the core components of the course.
2) Although students are able to set up a problem, they have not demonstrated proficiency in choosing the appropriate test statistic. As a result of these findings, the faculty involved with

teaching statistics 1 will now be able to focus more on this particular sub-task and attempt to identify the factors that are contributing to student difficulty with it.

3) This part of the assessment examined the third major stage of the process of performing a test of hypothesis. The students must be able to demonstrate that they can successfully analyze the results of such a test. The results indicate that the students have the greatest difficulty with this sub task. The faculty will need to follow up the assessment study with further investigation as to the factors that are causing this sub task to have the lowest success percentage of all the sub tasks in the problem. One of the possible explanations is that many students have difficulty with reading comprehension.

Recommendations:

One of the problems identified was that students are deficient in their reading comprehension, which contributes to their difficulty in choosing the proper test of hypothesis (z vs t) and in making decisions and writing conclusions based on the tests. To improve this, the committee recommends a series of take home assignments in spring 2012 designed to help students better interpret the problems. In addition, some exercises on the publisher's website may be assigned by the individual instructors.

MAT 150 - Quiz on Hypothesis Testing

Answer each of the following questions to the best of your ability. Make sure to read carefully. You may NOT ask your instructor any questions during the course of the quiz. You will have 20 minutes to complete the quiz.

1) Write the null and alternative hypotheses for each of the following situations. Then identify the test as either two-tailed or one tailed. If one tailed, specify left-tailed or right tailed.

   a) A water faucet manufacturer announces that the mean flow rate of a certain type of faucet is less than 2.5 gallons per minute.

   b) A consumer analyst reports that the mean life of a certain type of automobile battery is not 74 months.

2) In each of the following problems, compute the appropriate test statistic and find the critical value from the appropriate chart. Do ***NOT*** write a conclusion.

a) A pizza shop owner (who took a statistics class) claims that his mean delivery time is significantly less than 30 minutes, with a standard deviation of 3.5 minutes. A random selection of 36 delivery times has a sample mean of 28.5 minutes. Is the owner correct? (Use a 5% level of significance)

H_o: $\mu = 30$

$H_{a:}$: $\mu < 30$

b) A group of homeowners claim that the mean speed of automobiles traveling on their street is greater than the speed limit of 35 miles per hour. A random sample of 100 automobiles has a mean speed of 36 miles per hour and a standard deviation of 4 miles per hour. Is there enough evidence to support the claim at α = 1%?

H_o: $\mu = 35$

H_a: $\mu > 35$

3) In the following problem, make (and write) a decision about whether or not to reject the null hypothesis, and write a conclusion:

A restaurant association says that the typical household in the United States spends a mean of $2116 per year on food away from home. You are a consumer reporter for a national publication and want to test this claim. You randomly select 12 U.S. households and find that the mean amount of money spent by these households per year on food away from, home is $2423 with a standard deviation of $800. Can you reject the association's claim at α = 0.02? (Assume a normal distribution).

H_o: $\mu = 2116$

H_a: $\mu \neq 2116$

Test statistic: T = 1.33

Critical T = ± 2.718

MATHEMATICS ASSESSMENT: 2010 – 2012

Follow-up to original report of 2010-2011

During the academic year 2010 – 2011, an assessment was developed and subsequently administered to a sample of statistics classes. A benchmark of 70% was set as demonstrating success in the 3 areas of interest. The areas were:

1) Writing the null and alternative hypotheses: Identifying the test as either one-tailed or two-tailed and if one-tailed, specifying left or right tailed.
2) Computing the appropriate test statistic and finding the critical value from the appropriate chart
3) Making (and writing) a decision about whether or not to reject the null hypothesis, and writing a conclusion.

The results were as follows:

1) 81.2%
2) 58%
3) 56%

The committee met during the fall of 2011 to plan a course of action designed to improve the results in the 2 areas that feel below the benchmark. Before the test was administered, a homework assignment was given to the class to familiarize them with the format of the assessment that was being used. However, this homework assignment was collected but not reviewed with the class prior to the administration of the assessment. The decision was made to review the homework assignment prior to the administration of the assessment during the 2011-2012 academic year. The results of the assessment given in spring 2012 were:

1) 88.3%
2) 72%
3) 61%

While it is clear that reviewing the homework assignment improved the results, the third area of interest still falls below the benchmark. Students continue to have difficulty

formulating a conclusion, possibly due to poor reading skills. Often they look for ‘key words’ and fail to read the problem in context.

In the fall 2012 semester, a meeting will be convened of the entire statistics faculty to determine the best course of action to improve these results.

Respectfully submitted;

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