**Quiz #5 Name: JERRY JACOB**

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1. **(6 pts) In colonial times, suppose the time taken to get ship a package from London, England to Boston, Massachusetts is a random variable, not necessarily normally distributed. A Boston shipping company would like to claim that its average time for its ships to make the trip (one way only) is less than 70 days.**
2. **(2 pts) What is the appropriate null hypothesis to test this claim?**

**Null Hypothesis: Average time for the ship to make the trip >= 70**

**The shipping company has taken a sample of 20 previous shipments (all on different sailings) and has found that the sample mean is 65 days and the sample standard deviation is 15 days.**

1. **(3 pts) Test your null hypothesis using this data by determining the rejection region for a 95% confidence level, computing the test statistic, and making an appropriate recommendation.**

**Test Statistic = (65-70)/ (15/SQRT (20)) = -5/3.35 = -1.49**

**95% Confidence Interval: -T.INV (0.95,19) approximates to -1.73**

**Reject the null hypothesis if Test Statistic < -1.73**

**But since test statistic is greater than -1.73, We fail to reject the null hypothesis.**

**The Boston shipping companies claim have no guarantee.**

1. **(1 pt.) Compute the p-value associated with the test.**

**p-value: T. DIST (-1.49, 19, 1) = 0.076319**

1. **(4 points) In lecture 1 we looked at data from U.S. presidential elections. We saw that, since 1860, there have been 39 presidential elections with 16 “D” victories and 23 “R” victories.**

* 1. **(2 points) Given these data, construct a 95% confidence interval about the proportion of “D” victories. Explain briefly whether or not this analysis allows you to conclude that the results, although the proportion of “D” victories observed is less than 50%, do not differ in a statistically significant manner from what would be produced by flipping a fair coin (50-50 chance) to determine election outcomes.**

**Proportion of D victories: 16/39 = 0.41**

**Std. Error: SQRT ((0.41\*(1-0.41)/ 39) = 0.079**

**For 95% confidence interval, NORMSINV (.975) = 1.96**

**Upper Limit = 0.41 + (1.96\*0.079) = 0.41 + 0.155 = 0.565**

**Lower Limit = 0.41 - (1.96\*0.079) = 0.41 - 0.155 = 0.255**

**Based on the given sample, since 50% of D victories lies within the 95% confidence interval, it does not differ in a statistically significant manner from flipping a fair coin.**

* 1. **(2 points) As an alternate method of analysis, suppose you wish to conduct a hypothesis test. You want the test to be set up so that rejection of the null hypothesis will allow you to claim that the true proportion of “D” victories is less than what would be produced by flipping a fair coin. Specify the appropriate null hypothesis, determine a rejection region, compute your test statistic, and state your conclusion. Use a 95% confidence level.**

**Null hypothesis: Proportion of D victories >= 50**

**Test Statistic: (.41-.50)/0.079 = -1.14**

**For 95% confidence interval, -NORMSINV (0.95) = -1.64**

**Reject the null hypothesis if Test Statistic < -1.64**

**Since Test Statistic is greater than -1.64, we fail to reject the null hypothesis.**

**There is no guarantee that the true proportion of D victories is less than what would be produced by flipping a fair coin.**