Homework #35: Hypothesis Testing for Means and Proportions

**Hypothesis Testing for Means**

1. Total blood volume (in ml) per body weight (in kg) is important in medical research. For healthy children, the red blood cell volume mean is about μ = 31 ml/kg. Red blood cell volume that is too low or too high can indicate a medical problem. Suppose that a child had 9 blood tests and the blood volumes were

24 27 31 28 29 27 29 26 27

Do the data indicate that this child’s red blood cell volume is different (either way) from μ = 31 ml/kg? Use a 0.01 level of significance.

1. An inventor has developed a new, energy-efficient lawn mower engine. He claims that the engine will run continuously for 5 hours (300 minutes) on a single gallon of regular gasoline. Suppose a simple random sample of 50 engines is tested. The engines run for an average of 295 minutes, with a standard deviation of 20 minutes. Test the null hypothesis that the mean run time is 300 minutes against the alternative hypothesis that the mean run time is not 300 minutes. Use a 0.05 level of significance. (Assume that run times for the population of engines are normally distributed.)

3.) A restaurant claims that the waiting time of customers for

service is normally distributed with a mean of 3 minutes and a standard

deviation of σ = 1 minute. The quality assurance dept. found in a sample of

50 customers that the mean waiting time was 2.75 minutes. At the .05

significance level, can we conclude that the mean waiting time is less

than 3 minutes? Interpret the P-Value. Note: we know σ = 1 so we can use a z-test instead of a t-test.

P-Value:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**HYPOTHESIS TESTING FOR PROPORTIONS AGAIN**

1.) A team of doctors is testing a new drug that lowers cholesterol. It is known that 47% of patients who take the old drug see a lowered rate of cholesterol. Suppose that the doctors in various hospitals have given the new drug to a total of 85 people and that 44 patients see lowered cholesterol levels. Can we justify the claim that the new drug is **better** than the old one (use a 1% level of significance).

H0:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

H1:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

INTERPRETATION:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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2.) The CEO of a large electric utility claims that 80 percent of his 1,000,000 customers are very satisfied with the service they receive. A reporter believes that these satisfaction levels are l**ower**. To test this claim, the local newspaper surveyed 100 customers, using simple random sampling. Among the sampled customers, 72 percent say they are very satisfied. Based on these findings, can we reject the CEO's hypothesis that 80% of the customers are very satisfied? Use a 0.05 level of significance.

1. For proportions, which test (z or t) do you ALWAYS use?\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. For means, how do you know whether to use the z or t?
3. If you fail to reject the null hypothesis but still feel that you have a valid argument for the alternate hypothesis, what could you do to STRENGTHEN your claim and your results?

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