TA’S NAME:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Problem Set #5**

1. The p-value in hypothesis testing represents which of the following: Please select the best answer of those provided below.

a) The probability of failing to reject the null hypothesis, given the observed results

b) The probability that the null hypothesis is true, given the observed results

c) The probability that the observed results are statistically significant, given that the null hypothesis is true

d) The probability of observing results as extreme or more extreme than currently observed, given that the null hypothesis is true

1. Suppose you conduct a hypothesis test for the population proportion and your p-value is 0.184. Given a 0.10 level of significance, which of the following should be your conclusion?

a) accept HO

b) accept HA

c) Fail to reject HA

d) Fail to reject HO

e) Reject HO

1. Suppose our p-value is .044. What will our conclusion be at alpha levels of .10, .05, and .01?

a) We will reject H0 at a=.10, but not at alpha=.05

b) We will reject H0 at a =.10 or .05, but not at alpha=.01

c) We will reject H0 at a =.10, .05, or .01

d) We will not reject H0 at a =.10, .05, or .01

1. A hypothesis test is done in which the alternative hypothesis is that more than 10% of a population is left-handed. The p-value for the test is calculated to be 0.25. Which statement is correct?

a) We can conclude that more than 10% of the population is left-handed.

b) We can conclude that more than 25% of the population is left-handed.

c) We can conclude that exactly 25% of the population is left-handed.

d) We cannot conclude that more than 10% of the population is left-handed

1. Do more than 60% of Americans attend church on a regular basis? To find out I sampled 1,100 Americans and asked them; 693 of them said they attend church on a regular basis. Test the hypothesis that the population proportion of Americans who regularly attend church is greater than 0.60. Use =0.05. *Show your work.*

Hypotheses: H0: p≤0.60 H1: p>0.60

Assumptions: N(p0)=1100(0.6)=660; N(1-p0)=1100(0.4)=440

Confidence Level: =0.05

Critical Value: 1.65 (Reject H0 if Z > 1.65)

Test Statistic: 

Conclusion: Reject H0

1. I randomly sampled 60 people and asked them whether they like sushi. I observed that 35 of those people do like sushi. Test the hypothesis that in the population the proportion of people who like sushi is greater than 0.5. Use  = 0.05. Be sure to state the competing hypotheses, compute the appropriate test statistic, and state your conclusion about whether you reject or fail to reject H0. *Show your work*.



H0: p≤0.5 ; Ha: p>0.5

=0.05, and this is a one-sided test, so critical value Z\*=1.645; we will reject H0 if Z>1.645



Since Z does not exceed 1.645, we FAIL TO REJECT H0

1. I randomly sampled 1,000 cat owners and 1,000 dog owners and asked them how many hours per week they spend interacting with their pet; people who owned both dogs and cats were excluded from the study. Here are the results of my study:

N Mean Standard Deviation

Dog Owners 1,000 1.0 2.0

Cat Owners 1,000 10.0 5.0

Test the hypothesis that in the population the mean number of hours per week that dog owners spend with their pets is different than the mean number of hours per week that cat owners spend with their pets. Use  = 0.01. Be sure to state the competing hypotheses, compute the appropriate test statistic, and state your conclusion about whether you reject or fail to reject H0. *Show your work*.

ANSWER:

H0: Dog-Cat=0 ; Ha: Dog-Cat≠0

=0.01, and this is a two-tailed test, so critical value t\*=2.57; we will reject H0 if |t|>2.57



Since |t|>2.57, we REJECT H0

1. Researchers randomly selected 283 adults and asked them a variety of survey questions. Here are some of the results of their survey for the full sample and separately by gender:

***Question*: “Do You Own Your Own Home?”**

 Men Women *Total*

 Yes 67 70 137

 No 64 82 146

 *Total* 131 152 283

***Question*: “How Fast Do You Normally Drive on the Freeway?”**

 Mean Standard Deviation

 Men 77.1 12.2

 Women 72.3 11.0

 *Total* 74.2 11.6

Test the hypothesis that in the entire population more than 60% of people own their own homes; use a one-tailed test and an ** significance level 0.05. In plain language, what do you conclude? *Show your work.*

Our hypotheses: H0: *p≤*0.60 and Ha: *p*>0.60. We will reject H0 if Z*>*1.645

The sample proportion equals 137/283=0.48.

The test statistic is == -4.12. We fail to reject H0, meaning that we find no evidence that the population proportion of all people who own their own homes exceeds 0.60.

1. Test the hypothesis that in the entire population the mean speed that people normally drive on the freeway equals 75; use ** significance level 0.01. In plain language, what do you conclude?*Show your work.*

Our hypotheses: H0: **=75 and Ha: *≠*75.

The test statistics is == -1.16.

Since this is a two-sided *t* test with *df*=*n*-1=282 and ** significance level 0.01, we would reject H0 if our *t* statistic were greater than 2.63 or less than -2.63. Since *t* equals -1.16, we fail to reject H0. That is, we do not find evidence that the mean in the population differs from 75 miles per hour.

1. Test the hypothesis that men and women are equally likely to own their own homes; use ** significance level 0.05. In plain language, what do you conclude? *Show your work.*

Our hypotheses: H0: *p*M=*p*F and Ha: *p*M≠*p*F. We will reject H0 if Z*>*1.96

Here,$\hat{p}$M=67/131=0.51 and $\hat{p}$F=70/152=0.46

The test statistic is  where . So in our example,

=0.48 so =0.84. Since this is a two-sided *z* test with ** significance level 0.05, we would reject H0 if *z* were greater than 1.96 or less than -1.96. Since *z* equals 0.84, we fail to reject H0. That is, we find no evidence than men are any more or less likely than women to own their own homes.