Psych 315, Winter 2021, Homework 6 Answer Key

Due Friday, February 12th by 5pm.

Name ______________________________ ID ____________________

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Problem 1: Suppose you wanted to test the hypothesis that the mean weight of male Maine Coon cats is greater than 20 lbs. You know that the population is normally distributed with a standard deviation of 3 lbs.

You go and measure the weight of 36 male Maine Coon cats and find a mean weight of 20.13 lbs. Is this mean significantly greater than 20? Use an alpha value of $\alpha = 0.05$. Test this hypothesis in the following steps:

a) Specify the null hypothesis (H_0).

The mean weight of male Maine Coon cats is 20 pounds, $H_0 : \mu = 20$

b) Specify the alternative hypothesis (H_A).

We will use a one-tailed test, So our alternative hypothesis is
The mean weight of male Maine Coon cats is greater than 20 pounds, $H_0 : \mu > 20$

c) What is the standard error of the mean ($\sigma_{\bar{x}}$)?

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{3}{\sqrt{36}} = 0.5$

d) Convert your statistic into standard units with respect to your null hypothesis.

Since we know the population standard deviation, we'll use the z statistic:

$z = \frac{20.13-20}{0.5} = 0.26$

e) What is the critical value of z for rejecting the null hypothesis?

Since this is a one tailed test, from Table A:
$z_{crit} = 1.64$

f) What is your decision? State it as a full sentence using APA format.

Since z (0.26) is less than our critical value of z (1.64), we fail to reject H_0.

The mean weight of the male Maine Coon cats is not significantly greater than 20 lbs (z = 0.26, $p > 0.05$).

Problem 2

A Gallup poll estimates that the average American gets 6.8 hours of sleep each night. From our class survey, our sample of 152 of respondents has mean of sleep of 7.41 hours of sleep each night with a standard deviation of 1.18 hours. Test the hypothesis that this mean is significantly different from the US population average of 6.8 hours in the following steps. Use an alpha value of 0.05.

a) Specify the null hypothesis (H_0).

Our null hypothesis is that there is no difference between how much Psych 315 students sleep from the US population, $H_0 : \mu = 6.8$

b) Specify the alternative hypothesis (H_A).

We'll use a two-tailed test, So our alternative hypothesis is
H_A: $\mu \neq 6.80$ hours of sleep.

c) What is the standard error of the mean ($s_{\bar{x}}$)?

$s_{\bar{x}} = \frac{s_x}{\sqrt{n}} = \frac{1.1846}{\sqrt{152}} = 0.0961$

d) Convert your statistic into standard units with respect to your null hypothesis.

Since we don't know the population standard deviation, we'll use
the t statistic and our standard error of the mean, 0.0961 hours of sleep
with (152-1) = 151 degrees of freedom.

t = $\frac{7.41-6.80}{0.0961} = 6.40$

e) What is the critical value of t for rejecting the null hypothesis?

Since this is a two tailed test with df = 151, from Table D,
tcrit is $\pm$ 1.98

f) What is your decision? State it as a full sentence using APA format

Since the absolute value of t (6.40) is greater than
our critical value of t (1.98), we reject H_0.
The average amount of sleep for the students in our class is
significantly different from 6.80 inches (t(151) = 6.4, $p < 0.05$).

g) What is the effect size? Is it small, medium or large?

The effect size is g $= \frac{|7.41-6.8|}{1.18} = 0.52$

This is a medium effect size.

h) What is the p-value for this result? You can use the Excel calculator in tab D(t).'

Using the Excel calculator with t = 6.40, two tails and df = 151, p < 0.0001