Sample MATH 105-Test #2b.

1. Suppose for the hypotheses H_0:p=.25 and H_a: p≠.25 we get a test statistic of z=1.05. The p-value for this test is (circle one):

a) .8531 b) .1469 c) .2938 d) 1.7062

2. Bottles of a popular cola are suppose to contain 300 milliliters (ml) of cola. There is some variation from bottle to bottle because the filling machinery is not perfectly precise. I suspect that the machine is not filling the cola bottles enough and I sample 50 bottles and find a sample mean of 290 ml. The null and alternative hypotheses for a test to find evidence that the machine is not filling the bottles enough is

a) H_o: p=300 versus H_a: p<300 b) H_o: p=290 versus H_a: p<290
b) H_o: μ=300 versus H_a: μ<300 d) H_o: μ=290 versus H_a: μ<290

3-4. A 99% confidence interval for the mean number of chips, μ, in a Chips Ahoy bag of cookies based on a sample of 32 bags was found to be (987.6, 1032.4).

3. The margin of error is

a) 44.8 b) 22.4 c) 1010 d) 987.6 e) 1032.4

4. The sample mean, $\bar{x}$, is

a) 44.8 b) 22.4 c) 1010 d) 987.6 e) 1032.4

5. If we reject the null hypothesis at the .01 significance level (α=.01), would we also reject the null hypothesis at the .05 significance level (α=.05)?

a) Yes b) No c) can't tell without more information

6. If we were to test the hypotheses H_0: p=.4 versus H_1: p<.4 at the significance level of .05 and fail to reject H_0, then the p-value must be

a) less than .05 b) greater than .05 c) can't tell based on this information

7. Suppose that a potato chip company advertises that the mean weight of their bags of potato chips is 2 ounces. You believe that it is less than 2 ounces so you wish to test the hypothesis H_0: μ=2 versus H_1: μ<2. A 95% confidence interval based on a sample of potato chip bags is (1.56<μ<1.85). Based on this confidence interval, you would

a) Reject H_0 b) Fail to reject H_0

8. Increasing the sample size has what effect on the margin of error?

a) Increases it b) Decreases it c) No effect

9. Increasing the confidence level has what effect on the margin of error?

a) Increases it b) Decreases it c) No effect

10. Suppose μ= the average lifetime of a certain type of car battery, and based on a sample of 48 car batteries we test the following hypotheses:

H_o: μ=4 years
H_a: μ<4 years

(i) A type 1 error occurs if we conclude that:

a) the mean battery life is less than 4 years when in fact it is not
b) the mean battery life is different from 4 years when in fact it is not c) the mean battery life is four years when in fact it is less than 4 years
d) the mean battery life is four years when in fact it is different from 4 years

(ii) A type II error occurs if we conclude that:

a) the mean battery life is less than 4 years when in fact it is not
b) the mean battery life is different from 4 years when in fact it is not c) the mean battery life is four years when in fact it is less than 4 years
d) the mean battery life is four years when in fact it is more than 4 years

12. According to a Gallop poll, about 73% of 18-29-year-olds said that they were registered to vote. A statistics professor asked her students whether or not they were registered to vote. In a sample of 50 of her students, 35 said they were registered to vote.

a) Calculate a 95% confidence interval for the proportion of the professor's students who were registered to vote.

Calc. Function: A: 1Prop2Int

$.7 \pm 1.96\sqrt{\frac{.7 \times .3}{50}} = (.573, .827)$

b) Interpret your confidence interval.

We are 95% confident that between 57.3% & 82.7% of her students are registered to vote.

c) Does the 73% figure from the Gallop poll seem reasonable for the professor's class. Explain.

Yes since it is included in the confidence interval it is a reasonable value for p.

12. According to the U.S. Department of Transportation, the mean gas mileage of passenger cars was 21.2 miles per gallon in 2001. A researcher wanted to test the claim that the gas mileage has decreased since then. In 2009, he found that a random sample of 50 passenger cars had a sample mean of 19.95 mpg.

i) The null and alternative hypotheses are (circle one):

a) H_0: $\bar{x} = 19.95$	H_1: $\bar{x} < 19.95$	c) H_0: $\mu=19.95$	H_1: $\mu<19.95$
b) H_0: $\bar{x} = 21.2$	H_1: $\bar{x} < 21.2$	d) H_0: $\mu=21.2$	H_1: $\mu<21.2$

ii) The p-value for the above test is .35. Using a significance level of .05, give a one or two sentence conclusion for the hypothesis test in context of the problem.

We did not find enough evidence to reject H_0. Therefore, we can not conclude that the mean gas mileage has decreased since 2001.

13. Data on investments in the high-tech industry by venture capitalists are compiled by VentureOne Corportation and published in American's Network Telecom Investor Supplement. A random sample of 12 venture-capitol investments in the fiber optics business sector yielded the following data, in millions of dollars. Assume that s=2.0.

5.6 6.3 6.0 10.5 2.0 5.5 5.7 5.6 4.1 8.6 5.9 6.7

Calc fundion: $\boxed{8\text{:TInterval}}$

a) Compute a 90% confidence interval for the average amount of all venture-capitol investments in the fiber optics business sector.

$\bar{x} = 6.04 \qquad 6.04 \pm 1.796 \frac{2}{\sqrt{12}} = (5.00, 7.08)$

b) Interpret your confidence interval in a)

We can be 90% confident that the average amount of all venture-capitol investments is between \$5 & \$7.08 million.

14. A manufacturer considers his production process to be out of control when defects exceed 3%. In a random sample of 500 items, there were 28 defects. Test the claim that the production process is out of control. Use a significance level (α-level) of .05.

a) State the null and alternative hypotheses.

Calc. Function

$\boxed{5: 1PropZTest}$

$H_0: p = .03 \quad H_a: p > .03$

b) Compute the test statistic.

$\hat{p} = \frac{28}{500} = .056 \quad Z = \frac{.056 - .03}{\sqrt{\frac{.03 \times .97}{500}}} = 3.41$

c) Report the p-value.

$1 - .9997 = .0003$

d) Give a one or two sentence conclusion in context of the problem.

We can reject Ho & conclude that the production process is out of control (defects exceed 3%)

15. Suppose that a 90% confidence interval for a population mean has been calculated to be (27.4, 29.6) based on an SRS from the population. The p-value for the following test H_0: $\mu=28$ and H_1: $\mu\neq28$ would be:

a) Larger than 0.10
b) Smaller than 0.10
c) Can't tell based on the information