

Directions: For each question, you must:

- 1) label the Hypothesis Testing Model with the Critical values and Test Statistics**
- 2) List any calculator function(s) you use with the appropriate values you used to answer the question.**
- 3) Round z scores & percentages to 2 decimal places and decimal probabilities to 4 places.**

- 1. A food manufacturer claims that their new low-fat oat bran muffin has a population mean fat content of 3 grams with a population standard deviation of 0.79 grams. A government food researcher believes the manufacturer's claim is too low and decides to test the manufacturer's claim. A random sample of 49 muffins yields a sample mean fat content of 3.2 grams. Perform a hypothesis test at $\alpha = 5\%$ to determine if it is reasonable to agree with the researcher's claim.**

I. State the hypotheses (in words & symbols):

H_0 : _____

H_a : _____

II. Determine the model to test H_0

a) Can you use a normal distribution for the Sampling Distribution model to perform this test?

Please explain. If not, then what distribution could you use?

NAME _____ 2
b) Using the appropriate notation, state the MEAN & STD ERROR:

Mean: _____

STD Error: _____

III. Determine the Decision Rule:

State the decision rule: _____

IV. Analyze the sample data: Using the appropriate notation, state the sample result, p-value and the test statistic.

sample result is: _____

p-value is: _____

test statistic is: _____

V. State the Conclusion: _____

Answer Question: Do you believe that it is reasonable to agree with the researcher's claim at $\alpha = 5\%$? EXPLAIN. (No credit will be given without an explanation.)

2. An FM rock station claims that 90% of all its listeners are college students. A sponsor of the station decides to test this claim against the suspicion that the percentage is lower. A random sample of 1500 people is selected from the population of all listeners and it is determined that 1325 are college students. Perform a hypothesis test to answer the question: Do the sample results support the sponsor's claim at $\alpha = 1\%$?

NAME _____ 3
I. State the hypotheses (in words & symbols):

H_0 : _____

H_a : _____

II. Determine the model to test H_0

Can one use a normal distribution for the Sampling Distribution model to perform this test? Please explain. _____

b) Using the appropriate notation, state the MEAN & STD ERROR:

Mean: _____

STD Error: _____

III. Determine the Decision Rule:

State the decision rule: _____

IV. Analyze the sample data: Using the appropriate notation, state the sample result, p-value and the test statistic.

sample result is: _____

p-value is: _____

test statistic is: _____

V. State the Conclusion: _____

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Can the sponsor reject the rock station's claim at $\alpha = 1\%$? EXPLAIN. (No credit will be given without an explanation.)

3) A random sample of 600 M&Ms is selected from the population of plain M&Ms where the population proportion of yellow M&Ms is 20%.

a) State the mean and standard error of the sampling distribution using the proper notation for the mean and standard error.

b) Can the sampling distribution be approximated by a normal distribution? Show work to support your answer.

c) Using the sampling distribution, calculate the probability that a sample of 600 M&Ms selected at random contains at most 23% yellow M&Ms. Draw graph and shade area representing the probability

4) You are hired by a cell phone provider to determine the number of times per day their customers interact with their smartphone. You take a random sample of 28 customers and find the average number of interactions to be 60 times per day with a sample standard deviation of 6.

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4 a. If you plan to find a confidence interval for the population mean number of interactions, what distribution would you use and why?

b. Construct a 99% confidence interval estimate for the population mean number of interactions.

c. What is the margin of error for the confidence interval you found in part b?

d. A representative for the cell phone provider told you they believe the mean number of interactions per day was 65. What would you say to the company representative? Explain.

5) A statistics student at a New York State community college, randomly samples 200 students who own cell phones to determine if they play games on their phones. 57% stated that they use their mobile phones to play games.

Using this information, then:

a) construct a 90% confidence interval (to 3 decimal places) for the population proportion, p , of NYS community college cell phone users who play games on their phones.

b) construct a 95% confidence interval for the population proportion, p , of NYS community college cell phone users who play games on their phones.

c) determine the margin of error for both the 90% and 95% confidence interval estimates.

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d) What is the relationship between the confidence interval width and the margin of error?

e) Would it be reasonable for someone to state that 69% of NYS community college cell phone users play games on their cell phones? You must explain your answer to receive credit.

6) The name of theorem that states:

For any population, regardless of the shape of the population being randomly sampled, the sampling distribution of the mean can be reasonably approximated by a normal distribution whenever the sample size n is greater than 30.

Is: _____

7) The Speedy Oil Change Company advertises that the average mean time it takes to change a customer's oil is 30 minutes. After receiving complaints from dissatisfied customers, the management at Speedy Oil Change headquarters hired a researcher to investigate the complaints to determine if the oil change took significantly longer than 30

minutes. The researcher randomly investigates 16 oil changing jobs and computes the sample mean time to change a customer's oil is 32.8 minutes with a sample standard deviation of 6.9 minutes. Based on this sample result, can the researcher conclude that Speed Oil Change Company's claim is too low at $\alpha = 5\%$?

I. State the hypotheses (in words & symbols):

H_0 : _____

H_a : _____

II. Determine the model to test H_0

a) Can you use a normal distribution for the Sampling Distribution model to perform this test? Please explain. If not, then what distribution could you use?

b) Using the appropriate notation, state the MEAN & STD ERROR:

Mean: _____

STD Error: _____

III. Determine the Decision Rule:

State the decision rule: _____

IV. Analyze the sample data: Using the appropriate notation, state the sample result, p-value and the test statistic.

sample result is: _____

p-value is: _____

test statistic is: _____

V. State the Conclusion: _____

Answer Question: Based on this sample result, can the researcher conclude that *Speed Oil Change* Company's claim is too low at $\alpha = 5\%$? (No credit will be given without an explanation.)
