UNIVERSITY OF TEXAS AT AUSTIN

Quiz # 9

Hypothesis testing.

Provide your **final answer only** to the following questions.

Problem 9.1. (3 points) Complete the following sentence:

When conducting a hypothesis test, we _____ and then evaluate the test results to determine if there is enough evidence to _____.

(a) assume that the null hypothesis is false; accept the null hypothesis
(b) assume that the null hypothesis is true; reject the null hypothesis
(c) assume that the alternative hypothesis is true; reject the null hypothesis
(d) assume the alternative hypothesis is false; reject the alternative hypothesis

Solution: (b)

Problem 9.2. (3 points) A low-calorie snack company claims that, on average, there are 95 calories in its small bag of crackers. A consumer watchdog group is concerned that the company may be lying and that the population average is not actually 95 calories. An employee of the group samples 45 bags of chips and computes a 95% confidence interval of $(92, 118)$. When the employee reports her results, the head of the group says that she wanted to do inference using a 99% confidence interval. Which of the following is the best response the employee can give?

(a) It is standard practice to use a 95% confidence interval, so it does not make sense to use a 99% confidence interval.
(b) We will reject the null hypothesis in a two-sided test at the 99% confidence level.
(c) We will fail to reject the null hypothesis in a two-sided test at the 99% confidence level.
(d) We will accept the null hypothesis in a two-sided test at the 99% confidence level.
(e) I need to recompute the confidence interval and get back to you.

Solution: (c)
The null mean of 95 is already within the 95% confidence interval. So, it will also be within the wider 99% confidence interval. So, the null hypothesis cannot be rejected.

Problem 9.3. (3 points) *Source: "Probability and Statistics for Engineers and Scientists" by Walpole, Myers, Myers, and Ye.*
A manufacturer of a certain brand of cereal claims that the average saturated fat content does not exceed 1.5 grams per serving. You beg to differ. State the null and the alternative hypotheses to be used in testing the manufacturer's claim.

Solution:

$$H_0 : \mu = 1.5 \quad vs. \quad H_a : \mu > 1.5.$$

Problem 9.4. (3 points) A factory started producing a new type of cables. They claim that their mean minimum break strength capacity is 1200lb. You want to test their claim. State the null and the alternative hypotheses to be used in testing the factory's claim.

Solution:

$$H_0 : \mu = 1200 \quad vs. \quad H_a : \mu < 1200.$$

Problem 9.5. (3 points) A company produces liquid medication dispensers. The dispensers are calibrated so that the mean dose is 15 milliliters. You need to test for deviations from this amount. State the null and the alternative hypotheses to be used in the test.

Solution:

$$H_0 : \mu = 15 \quad vs \quad H_a : \mu \neq 15.$$