Lesson #59 · Topic 4C · Practice

Name _____

1. Employees at Subway are instructed to put three ounces of meat on 6-inch sandwiches. The manager worries that the newly hired employees at her restaurant are not following this guideline. She weighs the meat on a random sample of 25 six-inch sandwiches made by newly hired employees. State the hypotheses for performing a hypothesis test. Be sure to define the parameter of interest.

2. ZipRecruiter reports that the average annual salary for adults in Michigan is $49,560. Penelope wonders if the average annual salary is less for residents of her hometown Pentwater, a small town in Michigan. Penelope selects a random sample of 30 adults in Pentwater and calculates a mean annual salary of $42,813.

   a. State the hypotheses for performing a hypothesis test. Be sure to identify the parameter of interest.

   b. Is there some evidence for H_a ? Explain.

   c. Which question could Penelope answer by performing a hypothesis test? (Choose one).
      A. Is there convincing statistical evidence that the average annual salary in Michigan is $49,560?
      B. Is there convincing statistical evidence that the average annual salary in Michigan is less than $49,560?
      C. Is there convincing statistical evidence that the average annual salary in Pentwater is less than $49,560?
      D. Is there convincing statistical evidence that the average annual salary in Pentwater is $42,813?

3. The Mayo Clinic reports that Americans take an average of 3,500 steps daily. To investigate whether adults who wear fitness trackers take more steps, researchers gathered data from 17,000 randomly selected adults with fitness trackers. The mean number of daily steps was 4,735. The p -value for the hypothesis test was 0.003.

   a. Interpret the p -value.

   b. At the $\alpha = 0.05$ significance level, what conclusion can be made? Assume that all conditions for inference were met.

4. A student performs a hypothesis test of $H_0 : \mu = 75$, versus $H_a : \mu \neq 75$, given a sample mean of $\bar{x} = 81$, and obtains a p -value of 0.07. Each of the following statements is incorrect. For each statement, explain why it is incorrect and write a corrected version.

   a. There is a 0.07 probability of getting a $\bar{x}$ of 81 or greater, purely by chance.

   b. Because 0.07 > 0.05, we accept H_0 and we do have convincing evidence that the true mean is 75.

5. The National Institute of Child Health and Human Development recommends that pregnant women consume no more than 200 milligrams of caffeine per day to avoid the risk of smaller birth sizes. At a certain hospital, doctors investigated whether high caffeine intake among pregnant patients might explain smaller than typical birth sizes. A random sample of 22 pregnant patients at this hospital was asked to estimate the number of milligrams of caffeine they consumed each day. The mean response for the sample was 250 milligrams. Which of the following is an appropriate alternate hypothesis for a hypothesis test doctors could perform to test their claim?

A) $H_a : \mu > 200$

B) $H_a : \mu < 200$

C) $H_a : \mu \neq 200$

D) $H_a : \mu > 250$

6. A hypothesis test is performed of $H_0 : \mu = 29$ versus $H_a : \mu < 29$. Which of the following describes a Type II error for this test?

A) Failing to reject H_0 when the population mean is less than 29.

B) Rejecting H_0 when the population mean is 29.

C) Failing to reject H_0 when the population mean is 29.

D) Rejecting H_0 when the population mean is less than 29.