practice(chapter8)

Name_____

Solve the problem.

1) How many tissues should a package of tissues contain? Researchers have determined that a person uses an average of 42 tissues during a cold. Suppose a random sample of 10,000 people yielded the following data on the number of tissues used during a cold: $\bar{x} = 37$, $s = 25$. Identify the null and alternative hypothesis for a test to determine if the mean number of tissues used during a cold is less than 42.

    A) H_0: $\mu = 42$ vs. H_a: $\mu < 42$ B) H_0: $\mu = 42$ vs. H_a: $\mu \neq 42$

    C) H_0: $\mu = 42$ vs. H_a: $\mu > 42$ D) H_0: $\mu > 42$ vs. H_a: $\mu \leq 42$

1) _____

2) How many tissues should a package of tissues contain? Researchers have determined that a person uses an average of 58 tissues during a cold. Suppose a random sample of 10,000 people yielded the following data on the number of tissues used during a cold: $\bar{x} = 49$, $s = 19$. We want to test the alternative hypothesis H_a: $\mu < 58$. State the correct rejection region for $\alpha = .05$.

    A) Reject H_0 if $z < -1.96$.   B) Reject H_0 if $z > 1.96$ or $z < -1.96$.

    C) Reject H_0 if $z > 1.645$.   D) Reject H_0 if $z < -1.645$.

2) _____

3) How many tissues should a package of tissues contain? Researchers have determined that a person uses an average of 45 tissues during a cold. Suppose a random sample of 2500 people yielded the following data on the number of tissues used during a cold: $\bar{x} = 34$, $s = 21$. Suppose the corresponding test statistic falls in the rejection region at $\alpha = .05$. What is the correct conclusion?

    A) At $\alpha = .05$, reject H_0.   B) At $\alpha = .10$, reject H_a.

    C) At $\alpha = .10$, reject H_0.   D) At $\alpha = .05$, accept H_a.

3) _____

4) The hypotheses for H_0: $\mu = 125.4$ and H_a: $\mu \neq 125.4$ are tested at $\alpha = .10$. Sketch the appropriate rejection region.

4) _____

5) The owner of Get–A–Away Travel has recently surveyed a random sample of 381 customers to determine whether the mean age of the agency's customers is over 25. The appropriate hypotheses are H_0: $\mu = 25$, H_a: $\mu > 25$. If he concludes the mean age is over 25 when it is not, he makes a _____ error. If he concludes the mean age is not over 25 when it is, he makes a _____ error.

    A) Type II; Type I   B) Type I; Type I   C) Type I; Type II   D) Type II; Type II

5) _____

6) In a test of H_0: $\mu = 250$ against H_a: $\mu \neq 250$, a sample of $n = 100$ observations possessed mean $\bar{x} = 247.3$ and standard deviation $s = 11.4$. Find and interpret the p–value for the test.

6) _____

7) A national organization has been working with utilities throughout the nation to find sites for large wind machines that generate electricity. Wind speeds must average more than 22 miles per hour (mph) for a site to be acceptable. Recently, the organization conducted wind speed tests at a particular site. Based on a sample of $n = 33$ wind speed recordings (taken at random intervals), the wind speed at the site averaged $\bar{x} = 22.8$ mph, with a standard deviation of $s = 4.3$ mph. To determine whether the site meets the organization's requirements, consider the test, H_0: $\mu = 22$ vs. H_a: $\mu > 22$, where μ is the true mean wind speed at the site and $\alpha = .01$. Suppose the value of the test statistic were computed to be 1.07. State the conclusion.

7) _____

   A) At $\alpha = .01$, there is sufficient evidence to conclude the true mean wind speed at the site exceeds 22 mph.
   B) We are 99% confident that the site does not meet the organization's requirements.
   C) We are 99% confident that the site meets the organization's requirements.
   D) At $\alpha = .01$, there is insufficient evidence to conclude the true mean wind speed at the site exceeds 22 mph.

8) I want to test H_0: $p = .6$ vs. H_a: $p \neq .6$ using a test of hypothesis. If I concluded that p is .6 when, in fact, the true value of p is not .6, then I have made a _____.

8) _____

   A) Type I and Type II error   B) Type II error
   C) Type I error   D) correct decision

9) Given H_0: $\mu = 25$, H_a: $\mu \neq 25$, and $p = 0.034$. Do you reject or fail to reject H_0 at the .01 level of significance?

9) _____

   A) fail to reject H_0
   B) reject H_0
   C) not sufficient information to decide

10) If a hypothesis test were conducted using $\alpha = 0.10$, to which of the following p-values would cause the null hypothesis to be rejected.

10) _____

   A) 0.150   B) 0.110   C) 0.090   D) 0.105

11) In a test of H_0: $\mu = 65$ against H_a: $\mu > 65$, the sample data yielded the test statistic $z = 1.38$. Find and interpret the p-value for the test.

11) _____

12) According to an advertisement, a strain of soybeans planted on soil prepared with a specified fertilizer treatment has a mean yield of 96 bushels per acre. Fifteen farmers who belong to a cooperative plant the soybeans in soil prepared as specified. Each uses a 40–acre plot and records the mean yield per acre. The mean and variance for the sample of the 15 farms are $\bar{x} = 81$ and $s^2 = 10{,}125$.
Conduct a test of hypothesis to determine if the mean yield for the soybeans is not equal to 96 bushels per acre. Use $\alpha = .05$.

12) _____

Step1: (State the null and alternative hypotheses mathematically and in words of the problem.)

Step2: (calculate the value of the test statistic)

Step3:(find the rejection region.)

Step4: (Make a decision and state a complete conclusion.)

13) A poll of 1,068 adult Americans reveals that 48% of the voters surveyed prefer the Democratic candidate for the presidency. At the 0.05 level of significance, do the data provide sufficient evidence that the percentage of all voters who prefer the Democrat is less than 50%?

13) _____

Step1: (State the null and alternative hypotheses mathematically and in words of the problem.)

Step2: (calculate the value of the test statistic)

Step3:(find the rejection region and p-value .)

Step4: (Make a decision and state a complete conclusion.)

14) In a sample of 157 children selected randomly from one town, it is found that 38 of them suffer from asthma. At the 0.05 significance level, do the data provide sufficient evidence to conclude the proportion of all children in the town who suffer from asthma is different from 11%?

14) _____

    Step1: (State the null and alternative hypotheses mathematically and in words of the problem.)

    Step2: (calculate the value of the test statistic)

    Step3:(find the rejection region and p-value.)

    Step4: (Make a decision and state a complete conclusion.)

15) How many tissues should a package of tissues contain? Suppose a random sample of 10,000 people yielded the following data on the number of tissues used during a cold: $\bar{x} = 59$, $s = 19$. We want to test if an average number of tissues a person uses during a cold is more than 50. Conduct this test for $\alpha = .05$.

15) _____

    Step1: (State the null and alternative hypotheses mathematically and in words of the problem.)
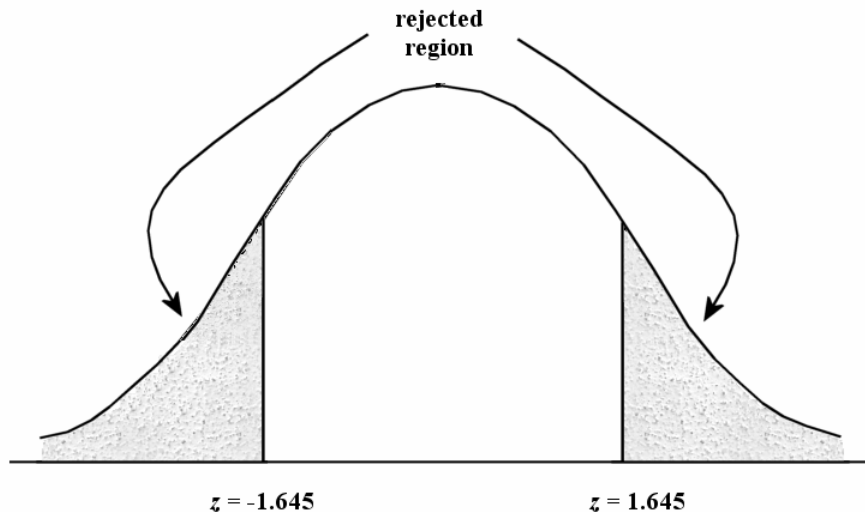
    Step2: (calculate the value of the test statistic)

    Step3:(find the rejection region and p-value.)

    Step4: (Make a decision and state a complete conclusion.)

1) A
2) D
3) A
4)

rejected
region

$z = -1.645$ $z = 1.645$

5) C

6) The z–statistic is $z = \dfrac{247.3 - 250}{11.4 / \sqrt{100}} \approx -2.36.$

p–value $= P(z < -2.36 \text{ or } z > 2.36) = 2(.5 - .4909) = .0182$; The probability of a test statistic even more contradictory to the null hypothesis than the one observed is .0182.

7) D
8) B
9) A
10) C
11) p–value $= P(z > 1.38) = .5 - .4162 = .0838$; The probability of a test statistic even more contradictory to the null hypothesis than the one observed is .0838.
12) The rejection region requires $\alpha/2 = .05/2 = .025$ in both tails of the t distribution with df $= n - 1 = 15 - 1 = 14$. The rejection region is $t > 2.145$ or $t < -2.145$.
13) H_0: $p = 0.5$ H_a: $p < 0.5$.

   $\alpha = 0.05$

   Test statistic: $z = -1.31$. Critical value: $z = -1.645$.

   Do not reject the null hypothesis. At the 5% level of significance, the data do not provide sufficient evidence to conclude that the percentage of voters who prefer the Democrat is less than 50%.
14) H_0: $p = 0.11$ H_a: $p \neq 0.11$.

   $\alpha = 0.05$

   Test statistic: $z = 5.29$. Critical values: $z = \pm 1.96$.

   Reject H_0. At the 5% level of significance, the data provide sufficient evidence to conclude that the proportion of all children in the town who suffer from asthma is different from 11%.
15)