

Name: _____

Express the null hypothesis and the alternative hypothesis in symbolic form. Use the correct symbol (μ , p , σ) for the indicated parameter.

- 1) The manufacturer of a refrigerator system for beer kegs produces refrigerators that are supposed to maintain a true mean temperature, μ , of 47°F, ideal for a certain type of German pilsner. The owner of the brewery does not agree with the refrigerator manufacturer, and claims he can prove that the true mean temperature is incorrect. 1) _____
- A) $H_0: \mu = 47^\circ$ B) $H_0: \mu \leq 47^\circ$ C) $H_0: \mu \neq 47^\circ$ D) $H_0: \mu \geq 47^\circ$
 $H_1: \mu \neq 47^\circ$ $H_1: \mu > 47^\circ$ $H_1: \mu = 47^\circ$ $H_1: \mu < 47^\circ$
- 2) A researcher claims that 62% of voters favor gun control. 2) _____
- A) $H_0: p \neq 0.62$ B) $H_0: p \geq 0.62$ C) $H_0: p = 0.62$ D) $H_0: p < 0.62$
 $H_1: p = 0.62$ $H_1: p < 0.62$ $H_1: p \neq 0.62$ $H_1: p \geq 0.62$
- 3) A cereal company claims that the mean weight of the cereal in its packets is just below 14 oz. 3) _____
- A) $H_0: \mu < 14$ B) $H_0: \mu > 14$ C) $H_0: \mu = 14$ D) $H_0: \mu = 14$
 $H_1: \mu \geq 14$ $H_1: \mu \leq 14$ $H_1: \mu > 14$ $H_1: \mu < 14$

Formulate the indicated conclusion in nontechnical terms. Be sure to address the original claim.

- 4) An entomologist writes an article in a scientific journal which claims that fewer than 17 in ten thousand male fireflies are unable to produce light due to a genetic mutation. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is to reject the null hypothesis, state the conclusion in nontechnical terms. 4) _____
- A) There is not sufficient evidence to support the claim that the true proportion is less than 17 in ten thousand.
 B) There is not sufficient evidence to support the claim that the true proportion is greater than 17 in ten thousand.
 C) There is sufficient evidence to support the claim that the true proportion is less than 17 in ten thousand.
 D) There is sufficient evidence to support the claim that the true proportion is greater than 17 in ten thousand.
- 5) A researcher claims that the amounts of acetaminophen in a certain brand of cold tablets have a standard deviation different from the $\sigma = 3.3$ mg claimed by the manufacturer. Assuming that a hypothesis test of the claim has been conducted and that the conclusion is failure to reject the null hypothesis, state the conclusion in nontechnical terms. 5) _____
- A) There is not sufficient evidence to support the claim that the standard deviation is different from 3.3 mg.
 B) There is sufficient evidence to support the claim that the standard deviation is equal to 3.3 mg.
 C) There is sufficient evidence to support the claim that the standard deviation is different from 3.3 mg.
 D) There is not sufficient evidence to support the claim that the standard deviation is equal to 3.3 mg.

Assume that a hypothesis test of the given claim will be conducted. Identify the type I or type II error for the test.

- 6) A company produces refrigerators for beer kegs. The refrigerators are supposed to maintain a mean temperature of 43°F, ideal for a certain type of German pilsner. The owner of the brewery does not agree with the company and claims that the mean temperature is incorrect. Identify the type II error for the test. 6) _____
- A) Reject the claim that the mean temperature is equal to 43°F when it is actually 43°F.
 - B) Reject the claim that the mean temperature is equal to 43°F when it is actually different from 43°F.
 - C) Fail to reject the claim that the mean temperature is equal to 43°F when it is actually different from 43°F.
 - D) Fail to reject the claim that the mean temperature is equal to 43°F when it is actually 43°F.
- 7) A consumer advocacy group claims that the mean mileage for the Carter Motor Company's new sedan is less than 21 miles per gallon. Identify the type I error for the test. 7) _____
- A) Fail to reject the claim that the mean is equal to 21 miles per gallon when it is actually less than 21 miles per gallon.
 - B) Fail to reject the claim that the mean is equal to 21 miles per gallon when it is actually greater than 21 miles per gallon.
 - C) Reject the claim that the mean is equal to 21 miles per gallon when it is actually less than 21 miles per gallon.
 - D) Reject the claim that the mean is equal to 21 miles per gallon when it is actually 21 miles per gallon.

Identify the null hypothesis, alternative hypothesis, test statistic, P-value, conclusion about the null hypothesis, and final conclusion that addresses the original claim.

- 8) A manufacturer considers his production process to be out of control when defects exceed 3%. In a random sample of 185 items, five of them are found to be defective. At the 0.02 level of significance, test the manager's claim that the defect rate is 3%.

- 9) According to a recent poll 52% of Americans would vote for the incumbent president. If a random sample of 100 people results in 44 who would vote for the incumbent, test the claim that the actual percentage is 52%. Use a 0.05 significance level.

Assume that a simple random sample has been selected from a normally distributed population and test the given claim. Use either the traditional method or P-value method as indicated. Identify the null and alternative hypotheses, test statistic, critical value(s) or P-value (or range of P-values) as appropriate, and state the final conclusion that addresses the original claim.

10) Use a significance level of $\alpha = 0.05$ to test the claim that $\mu = 32.6$. The sample data consist of 15 scores for which $\bar{x} = 41.6$ and $s = 8$. Use the traditional method of testing hypotheses.

11) Use a significance level of $\alpha = 0.01$ to test the claim that $\mu > 2.85$. The sample data consist of 9 scores for which $\bar{x} = 3.19$ and $s = 0.55$. Use the traditional method of testing hypotheses.

12) In tests of a computer component, it is found that the mean time between failures is 510 hours. A modification is made which is supposed to increase the time between failures. Tests on a random sample of 10 modified components resulted in the following times (in hours) between failures.

518	548	561	523	536
499	538	557	528	553

At the 0.05 significance level, test the claim that for the modified components, the mean time between failures is greater than 510 hours. Use the P-value method of testing hypotheses.

Identify the null hypothesis, alternative hypothesis, test statistic, P-value, conclusion about the null hypothesis, and final conclusion that addresses the original claim.

13) The health of employees is monitored by periodically weighing them in. A sample of 54 employees has a mean weight of 183.9 lb. Assuming that σ is known to be 121.2 lb, use a 0.10 significance level to test the claim that the population mean of all such employees weights is less than 200 lb.

Test the indicated claim about the means of two populations. Assume that the two samples are independent simple random samples selected from normally distributed populations. Do not assume that the population standard deviations are equal. Use the traditional method or P-value method as indicated.

- 14) A researcher was interested in comparing the resting pulse rates of people who exercise regularly and of those who do not exercise regularly. Independent simple random samples of 16 people who do not exercise regularly and 12 people who exercise regularly were selected, and the resting pulse rates (in beats per minute) were recorded. The summary statistics are as follows.

<u>Do not exercise regularly</u>	<u>Exercise regularly</u>
$\bar{x}_1 = 73.2$ beats/min	$\bar{x}_2 = 68.9$ beats/min
$s_1 = 10.9$ beats/min	$s_2 = 8.2$ beats/min
$n_1 = 16$	$n_2 = 12$

Use a 0.025 significance level to test the claim that the mean resting pulse rate of people who do not exercise regularly is larger than the mean resting pulse rate of people who exercise regularly. Use the traditional method of hypothesis testing.