Name______________________________ Course Number:__________ Section Number:__________

Directions: Answer the questions and solve the problems in the spaces provided, or attach paper. Circle the correct choice for each response set.

Provide an appropriate response.

1) Suppose the claim is in the alternate hypothesis. What form does your conclusion take? Suppose the claim is in the null hypothesis. What form does your conclusion take?

2) Tim believes that a coin is coming up tails less than 50% of the time. He tests the claim p < 0..5. In 100 tosses, the coin comes up tails 57 times. What is the value of the sample proportion? Do you think the P–value will be small or large and what should Tim conclude about the claim $p < 0.5$?

Solve the problem.

3) What do you conclude about the claim below? Do not use formal procedures or exact calculations. Use only the rare event rule and make a subjective estimate to determine whether the event is likely.

Claim: A company claims that the proportion of defective units among a particular model of computers is 4%. In a shipment of 200 such computers, there are 10 defective units.

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

4) Carter Motor Company claims that its new sedan, the Libra, will average better than 30 miles per gallon in the city. Use μ, the true average mileage of the Libra.

A) H_0: $\mu > 30$ H_1: $\mu \le 30$

B) H_0: $\mu < 30$ H_1: $\mu \ge 30$

C) H_0: $\mu = 30$ H_1: $\mu < 30$

D) H_0: $\mu = 30$ H_1: $\mu > 30$

Assume that the data has a normal distribution and the number of observations is greater than fifty. Find the critical z value used to test a null hypothesis.

5) $\alpha = 0.05$ for a left-tailed test.

A) ±1.645 B) −1.645 C) −1.96 D) ±1.96

Find the value of the test statistic z using $z = \frac{\hat{p} - p}{\sqrt{\frac{pq}{n}}}$.

6) A claim is made that the proportion of children who play sports is less than 0.5, and the sample statistics include n = 1200 subjects with 40% saying that they play a sport.

A) 6.93 B) −6.93 C) 1.67 D) −1.67

Use the given information to find the P–value. Also, use a 0.05 significance level and state the conclusion about the null hypothesis (reject the null hypothesis or fail to reject the null hypothesis).

7) With H_1: $p < 2/5$, the test statistic is $z = -1.68$.

A) 0.9535; fail to reject the null hypothesis

B) 0.0465; fail to reject the null hypothesis

C) 0.0465; reject the null hypothesis

D) 0.093; fail to reject the null hypothesis

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

8) The principal of a senior high school claims that test scores of the eleventh–graders at his school vary less than the test scores of the eleventh–graders at a neighboring school, which have variation described by $\sigma = 12.8$. 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.

A) There is not sufficient evidence to support the claim that the standard deviation is less than 12.8.

B) There is not sufficient evidence to support the claim that the standard deviation is greater than 12.8.

C) There is sufficient evidence to support the claim that the standard deviation is less than 12.8.

D) There is sufficient evidence to support the claim that the standard deviation is greater than 12.8.

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

9) The principal of a school claims that the percentage of students at his school that come from single–parent homes is 20%. Identify the type II error for the test.

A) Fail to reject the claim that the percentage of students that come from single–parent homes is equal to 20% when that percentage is actually different from 20%.

B) Reject the claim that the percentage of students that come from single–parent homes is equal to 20% when that percentage is actually 20%.

C) Fail to reject the claim that the percentage of students that come from single–parent homes is equal to 20% when that percentage is actually 20%.

D) Reject the claim that the percentage of students that come from single–parent homes is equal to 20% when that percentage is actually less than 20%.

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

10) A supplier of digital memory cards claims that no more than 1% of the cards are defective. In a random sample of 600 memory cards, it is found that 3% are defective, but the supplier claims that this is only a sample fluctuation. At the 0.01 level of significance, test the supplier's claim that no more than 1% are defective.

Find the P–value for the indicated hypothesis test.

11) A medical school claims that more than 28% of its students plan to go into general practice. It is found that among a random sample of 130 of the school's students, 32% of them plan to go into general practice. Find the P–value for a test of the school's claim.

A) 0.1635 B) 0.3461 C) 0.1539 D) 0.3078

Determine whether the given conditions justify testing a claim about a population mean μ.

12) For a simple random sample, the size is $n = 39$, $\sigma = 12.3$, and the original population is not normally distributed.

A) Yes B) No

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 given claim. Use the P–value method or the traditional method as indicated. Identify the null hypothesis, alternative hypothesis, test statistic, critical value(s) or P–value, conclusion about the null hypothesis, and final conclusion that addresses the original claim.

14) The mean resting pulse rate for men is 72 beats per minute. A simple random sample of men who regularly work out at Mitch's Gym is obtained and their resting pulse rates (in beats per minute) are listed below. Use a 0.05 significance level to test the claim that these sample pulse rates come from a population with a mean less than 72 beats per minute. Assume that the standard deviation of the resting pulse rates of all men who work out at Mitch's Gym is known to be 6.8 beats per minute. Use the traditional method of testing hypotheses.

54	60	66	84	74	64	69
70	66	80	59	71	76	63

Determine whether the hypothesis test involves a sampling distribution of means that is a normal distribution, Student t distribution, or neither.

15) Claim: $\mu = 119$. Sample data: $n = 15$, $\overline{x} = 103$, $s = 15.2$. The sample data, for this simple random sample, appear to come from a normally distributed population with unknown μ and σ.

A) Neither B) Normal C) Student t

Assume that a simple random sample has been selected from a normally distributed population. Find the test statistic, P–value, critical value(s), and state the final conclusion.

16) Test the claim that the mean lifetime of car engines of a particular type is greater than 220,000 miles. Sample data are summarized as $n = 23$, $\overline{x} = 226{,}450$ miles, and $s = 11{,}500$ miles. Use a significance level of $\alpha = 0.01$.

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.

17) 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 $\overline{x} = 3.28$ and $s = 0.57$. Use the traditional method of testing hypotheses.

18) A cereal company claims that the mean weight of the cereal in its packets is 14 oz. The weights (in ounces) of the cereal in a random sample of 8 of its cereal packets are listed below. Use the P–value method of testing hypotheses.

14.6 13.8 14.1 13.7 14.0 14.4 13.6 14.2

Test the claim at the 0.01 significance level.

Find the critical value or values of χ^2 based on the given information.

19) H_0: $\sigma = 8.0$
$n = 10$
$\alpha = 0.01$

A) 1.735, 23.589 B) 2.088, 21.666 C) 21.666 D) 23.209

Use the traditional method to test the given hypothesis. Assume that the population is normally distributed and that the sample has been randomly selected.

20) When 12 bolts are tested for hardness, their indexes have a standard deviation of 41.7. Test the claim that the standard deviation of the hardness indexes for all such bolts is greater than 30.0. Use a 0.025 level of significance.

1) Alternate: The sample data either supports or does not support. Null: The sample evidence warrants rejection or does not warrant rejection.
2) $\hat{p} = 0.57$; The P-value will be large. Tim should conclude that there is not sufficient evidence to support the claim $p < 0.5$.
3) If the defective rate were really 4%, one could easily obtain 10 defective units among 200 computers by chance; this is not improbable. Therefore, by the rare event rule, we have no reason to reject the claim that the defective rate is 4%.
4) D
5) B
6) B
7) C
8) C
9) A
10) H_0: $p = 0.01$. H_1: $p > 0.01$. Test statistic: $z = 4.92$. P-value: $p = 0.0001$.
    Critical value: $z = 2.33$. Reject null hypothesis. There is sufficient evidence to warrant rejection of the claim that no more than 1% are defective. Note: Since the term "no more than" is used, the translation is $p \le 0.01$. Therefore, the competing hypothesis is $p > 0.01$.
11) C
12) A
13) H_0: $\mu = 200$; H_1: $\mu < 200$; Test statistic: $z = -0.98$. P-value: 0.1635. Fail to reject H_0. There is not sufficient evidence to support the claim that the mean is less than 200 pounds for all such employees.
14) H_0: $\mu = 72$ beats per minute
    H_1: $\mu < 72$ beats per minute
    Test statistic: $z = -2.04$
    Critical-value: $z = -1.645$
    [P-value = 0.0207]
    Reject H_0. At the 5% significance level, there is sufficient evidence to support the claim that these sample pulse rates come from a population with a mean less than 72 beats per minute.
15) C
16) $\alpha = 0.01$
    Test statistic: $t = 2.6898$
    P-value: $p = 0.0067$ (by STATDISK & TI-84+ calculator); $0.005 < \text{P-value} < 0.01$ (by Table A-3)
    Critical value: $t = 2.508$
    Because the test statistic, $t > 2.508$, we reject the null hypothesis. There is sufficient evidence to accept the claim that $\mu > 220{,}000$ miles.
17) H_0: $\mu = 2.85$. H_1: $\mu > 2.85$. Test statistic: $t = 2.26$. Critical value: $t = 2.896$. Fail to reject H_0. There is not sufficient evidence to support the claim that the true mean is greater than 2.85.
18) H_0: $\mu = 14$ oz. H_1: $\mu \ne 14$ oz. Test statistic: $t = 0.4082$. P-value = 0.6953 (by STATDISK & TI-84+ calculator); P-value > .20 (by Table A-3). Fail to reject H_0. There is not sufficient evidence to warrant rejection of the claim that the true mean weight is 14 ounces.
19) A
20) H_0: $\sigma = 30.0$. H_1: $\sigma > 30.0$. Test statistic: $\chi^2 = 21.253$. Critical value: $\chi^2 = 21.920$. Fail to reject the null hypothesis. There is not sufficient evidence to support the claim that the standard deviation is greater than 30.0.