Math 281 Unit II Practice Exam

Name_____

There are fifteen multiple choice questions on the test, each worth three (3) points. You begin with five points for a total of fifty (50) points. For questions involving numerical answers, please select the option with the value closest to the correct answer.
MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

If Z is a standard normal variable, find the probability.

1) The probability that Z lies between 0.7 and 1.98 1) _____
A) 0.2181 B) 1.7341 C) -0.2181 D) 0.2175

Assume that X has a normal distribution, and find the indicated probability.

2) The mean is $\mu = 137.0$ and the standard deviation is $\sigma = 5.3$. 2) _____
Find the probability that X is between 134.4 and 140.1.
A) 1.0311 B) 0.8138 C) 0.4088 D) 0.6242

Solve the problem.

3) Scores on a test are normally distributed with a mean of 67.3 and a standard deviation of 9.3. Find P_{81}, which separates the bottom 81% from the top 19%. 3) _____
A) 0.88 B) 75.5 C) 70.0 D) 0.291

Find the indicated probability.

4) The lengths of human pregnancies are normally distributed with a mean of 268 days and a standard deviation of 15 days. What is the probability that a pregnancy lasts at least 300 days? 4) _____
A) 0.0165 B) 0.0179 C) 0.9834 D) 0.4834

Solve the problem.

5) The weights of the fish in a certain lake are normally distributed with a mean of 15 lb and a standard deviation of 9. If 9 fish are randomly selected, what is the probability that the mean weight will be between 12.6 and 18.6 lb? 5) _____
A) 0.0968 B) 0.6731 C) 0.3270 D) 0.4032

Find the minimum sample size you should use to assure that your estimate of $\hat{p}$ will be within the required margin of error around the population p.

6) Margin of error: 0.09; confidence level: 95%; from a prior study, $\hat{p}$ is estimated by the decimal equivalent of 87%. 6) _____
A) 5 B) 48 C) 54 D) 162

Use the given degree of confidence and sample data to construct a confidence interval for the population proportion p.

7) When 298 college students are randomly selected and surveyed, it is found that 111 own a car. Find a 99% confidence interval for the true proportion of all college students who own a car. 7) _____
A) $0.307 < p < 0.438$ B) $0.326 < p < 0.419$
C) $0.318 < p < 0.427$ D) $0.300 < p < 0.445$

Use the given degree of confidence and sample data to construct a confidence interval for the population mean μ. Assume that the population has a normal distribution.

8) The football coach randomly selected ten players and timed how long each player took to perform a certain drill. The times (in minutes) were: 8) _____

5.9 5.9 5.6 5.2 5.8
5.4 5.1 5.4 5.9 5.6

Determine a 95 percent confidence interval for the mean time for all players.

A) $5.37 < \mu < 5.80$ B) $5.88 < \mu < 5.28$ C) $5.28 < \mu < 5.88$ D) $5.78 < \mu < 5.38$

Express the null hypothesis H_0 and the alternative hypothesis H_1 in symbolic form. Use the correct symbol (μ, p, σ)for the indicated parameter.

9) Carter Motor Company claims that its new sedan, the Libra, will average better than 23 miles per gallon in the city. Use μ, the true average mileage of the Libra. 9) _____

A) $H_0: \mu < 23$, $H_1: \mu \geq 23$ B) $H_0: \mu = 23$, $H_1: \mu < 23$ C) $H_0: \mu > 23$, $H_1: \mu \leq 23$ D) $H_0: \mu = 23$, $H_1: \mu > 23$

Find the P-value for the indicated hypothesis test.

10) A manufacturer claims that fewer than 6% of its fax machines are defective. In a random sample of 97 such fax machines, 5% are defective. Find the P-value for a test of the manufacturer's claim. 10) _____

A) 0.1736 B) 0.3630 C) 0.1591 D) 0.3264

11) A random sample of 139 forty-year-old men contains 26% smokers. Find the P-value for a test of the claim that the percentage of forty-year-old men that smoke is 22%. 11) _____

A) 0.2671 B) 0.2802 C) 0.1271 D) 0.1401

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

12) An entomologist writes an article in a scientific journal which claims that fewer than 16 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. 12) _____

A) There is sufficient evidence to support the claim that the true proportion is greater than 16 in ten thousand.
B) There is sufficient evidence to support the claim that the true proportion is less than 16 in ten thousand.
C) There is not sufficient evidence to support the claim that the true proportion is greater than 16 in ten thousand.
D) There is not sufficient evidence to support the claim that the true proportion is less than 16 in ten thousand.

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

13) Claim: $\mu = 72$. Sample data: $n = 23$, $\bar{x} = 109$, $s = 15.1$. The sample data appear to come from a population with a distribution that is very far from normal, and σ is unknown. 13) _____

A) Neither B) Normal C) Student t

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

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

14) 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. 14) _____

Test the given claim using the traditional method of hypothesis testing. Assume that the sample has been randomly selected from a population with a normal distribution.

15) In tests of a computer component, it is found that the mean time between failures is 520 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. 15) _____

518 548 561 523 536
499 538 557 528 563

At the 0.05 significance level, test the claim that for the modified components, the mean time between failures is greater than 520 hours.

Answer Key
Testname: UNIT_2_PRACTICE_EXAM[1]

1) A
2) C
3) B
4) A
5) B
6) C
7) D
8) A
9) D
10) B
11) A
12) B
13) A
14) 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 warrrant the rejection of the claim that the mean equals 200.
15) Test statistic: $t = 2.612$. Critical value: $t = 1.833$. Reject H_0. There is sufficient evidence to support the claim that the mean is greater than 520 hours.