PRACTICE EXAM 2

	15
	D. $\mu_X = 16$ and $\sigma_{\bar{x}} = 2$. D. $\mu_{\bar{X}} = 18$ and $\sigma_{\bar{x}} = 6$
	$\mu_X = 2$ and $\sigma_x = \pi$. $C_{\mu\alpha} = 18$ and $\sigma_z = 2$
	A. $\mu_X = 2$ and $\sigma_{\overline{x}} = 2$. B. $\mu_{\overline{x}} = 2$ and $\sigma_{\overline{x}} = 4$
103.	Consists surprise tension sampling from a normal distribution with mean $\mu = 10$ and shifting devia- tion $\sigma = 6$. For samples of size 9, the sampling distribution for X has mean and standard deviation equal to:
109	D. $\mu_x = \mu$ and $\sigma_x = \sigma/sqrtn$, but the shape of the distribution is unknown. Consider simple random sampling from a normal distribution with mean $\mu = 18$ and standard devia-
	C. N(0, 1)
	B. $N(\mu, \sigma/\sqrt{n})$
	A. $N(\mu, \sigma)$
108.	ii the population distribution is $N(\mu, \sigma)$, then the sample mean of n independent observations is distributed as
100	D, the sample standard deviation S is approximately normally distributed.
	C. the population distribution (A distribution) is approximately normally distributed.
	B. the sample mean X is approximately normally distributed.
	A. the sample mean X approaches the population mean μ .
	bution with finite standard deviation,
107.	The Central Limit Theorem states that when a large simple random sample is selected from a distri-
	D. 0.3707
	C. 0.6293
	B. 0.9772
	A 0.0228
	mean of 36 randomly-selected lecture times. What is the probability that the sample mean exceeds 50 minutes?
-00.	distribution with mean 51 minutes and standard deviation 3 minutes. Let X represent the sample
106	Although Math 181 lecture periods are supposed to last 50 minutes, the actual lecture times have a
	D. is a histogram showing the distribution of the sample.
	that could be taken nom the population. C. of any statistic has an approximate normal distribution
	B. of the sample mean is a distribution of the means taken from all possible samples of a given size n that available taken from the negative
	A. is a distribution of all the various sample statistics that can be found for one sample.
105.	A sampling distribution:
	D. 18.0
	C. 3.0
	B. 2.0
	A. 0.5
	with a mean $\mu = 100$ and a standard deviation $\sigma = 18$.
104.	Find the standard deviation of the sample mean where samples of size 36 are taken from a population
	D. Approximately normal with unknown mean and standard deviation.
	D. N(13.5, 0.21) C. N(13.5, 0.021)
	A. N(13.5, 2.1) P. N(12.5, 0.21)
	this population. What is the sampling distribution of X?
	and a standard deviation of 2.1 inches. Suppose random samples of $n = 100$ trout are selected from
103.	Suppose the population of rainbow trout lengths follow a normal distribution with mean 13.5 inches

117.	TRUE or FALSE: A p-value is computed assuming that the null hypothesis is true.
118.	A medical researcher is interested in estimating the true mean cost of hospital care for recovery from acute mycoardial infraction. Assume the population standard deviation of recovery costs is \$1200. For a random sample of 16 hospitals, it was found that the mean recovery cost, x , is \$15000. The 99% confidence interval for the true mean cost of recovery for all hospitals is (rounded to nearest whole numbers):
	A. (14116, 15884)
	B. (14227, 15773)
	C. (14123,15876)
	D. (14225, 15775)
119.	Given that the 99% confidence interval for μ is (42, 58), which of the following could be the 95% confidence interval (for the same data)? A. 43 and 57 B. 41 and 50
	C 41 and 57
120.	Which of the following assumptions are needed to use the sample mean (X) and the normal table to test hypotheses about a population mean, μ , with known population standard deviation σ ? I. The data are a random sample.
	II. The population distribution is normal.
	III. The sample size is large $(n \ge 30)$.
	A L II and III
	B Land either II or III
	C. II and III
	D. only II
121.	When an experimenter selects a particular significance level (α) he is setting the probability of:
	A. rejecting H_o when in fact it is true.
	B. failing to reject H_o when in fact it is true.
	C. rejecting H_o when in fact it is false.
	D. failing to reject H_o when in fact it is false.
122.	If (5, 8) is a 95% confidence interval for μ , then:
	A. the probability that μ lies in the interval (5, 8) is 0.95.
	B. the probability that \bar{x} lies in the interval (5, 8) is 0.95.
	C. we are 95% confident that μ lies in the interval (5, 8).
	D. we are 95% confident that \bar{x} lies in the interval (5, 8).
123.	If a 95% confidence interval for μ is (452, 470), then the probability is that the true mean (μ) falls in the interval (452, 470).
	A. 0
	B. 0.05
	C. 0.95
	D. 1
	E. Either A. or D., but cannot determine which one is true.
124.	Which of the following statements is TRUE? Given that σ is known, the confidence interval for μ will become
	I. Wider as the sample size increases.
	II. Narrower as the sample size increases.

11	0. If the population distribution of scores (X) is normally distributed, then the sampling distribution of X (assuming the sample is randomly selected) will be:
	A. normally distributed only if n is large.
	B. normally distributed for any sample size.
	C. normally distributed only if X is large.
	D. none of the above.
	Matching.
11	1. Which of these statistical concepts is described in the following statement?
	A. Central Limit Theorem
	B. Law of Large Numbers
	C. Sampling Variability
	D. Statistical Inference
	The sampling distribution of X (given that $n \ge 30$) will be approximately normal, even if the population distribution is not normal.
11	 The Central Limit Theorem states that when a large random sample is selected from a non-normal population,
	A. the sample mean X approaches the population mean μ .
	B. the sample mean X is approximately normally distributed.
	C. the population distribution (X distribution) is approximately normally distributed.
	D. the sample standard deviation S is approximately normally distributed.
	Use the following description to answer the next two questions.
	Suppose that for a sample of 64 Family Nurse Practitioners (FNP's) from several similar type hospital clinics, a competency score ranging from 0 to 100 is devived based on performance at the clinic. Suppose further that the population mean competency score for all FNP's is 80 and the population strategies distributions and score for all forms of the population of the score of the

- 113. For the sample of 64 FNP's, what is the probability that the sample mean competency score will be between 75 and 80?
 - A. 0.4772

B. 0.5228

C. 0.0987

- D. 0.9013
- 114. Use the 68-95-99.7 rule to find the middle 68% of the distribution of the sample mean competency score.
 - A. (79.7, 80.3)
 - B. (60, 100) C. (75, 85)

D. (77.5, 82.5)

- 115. With everything else held constant, the width of a confidence interval as the confidence level increases. A. decreases

B. increases C. remains the same

116. In a statistical test of hypotheses, we say that the data are statistically significant at level α if

A. $\alpha = 0.05$

- B. α is small
- C. the p-value is less than or equal to α
- D. the p-value is greater than α .

16

III. Wider as the confidence level increase IV. Narrower as the confidence level increases. A. I. and III. B. II. and IV. C. I. and IV. D. II. and III. 125. The National Council of Teachers of Mathematics is interested in estimating the true mean salary for all high school math teachers in the U.S. The 95% confidence interval they found was (\$31668, \$33332). Can we be certain that the true mean falls in this interval? A. No, because the true mean is in this interval only 95% of the time. B. Yes, because the sample mean is unbiased for the population mean. C. No, we are 95% confident that the true mean falls in this interval. D. Yes, we are certain that the true mean falls in this interval. 126. All Geo-Metro automobiles are advertised as getting an average of 48 miles per gallon (MPG) on the highway. Consumer's Digest decides to test drive a sample of the cars to see if the MPG is lower than advertised, as some buyers claim. What are the H_o and H_a ? A. $H_o: \mu = 48$ and $H_a: \mu \neq 48$ B. $H_o: \mu = 48$ and $H_a: \mu < 48$ C. $H_o: \mu = 48$ and $H_a: \mu > 48$ 127. Suppose a simple random sample of size 9 was selected from a normally distributed population with standard deviation σ = 3.3. The margin of error for the 90% confidence interval for the population mean μ is A 2.16 B. 1.10 C. 1.96 D. 1.81 128. If the hypotheses $H_o: \mu=5$ versus $H_a: \mu<5$ are tested at the 0.05 significance level, then which of the following is true? A. P(Type I Error)=0.05 B. P(Type II Error)=0.05 C. P(Type I Error)=0.95 D. P(Type II Error)=0.95 129. In hypothesis testing, a type I error is A. failing to reject H_o when H_o is false. B. failing to reject H_o when H_o is true. C. rejecting H_o when H_o is true. D. rejecting H_o when H_o is false. 130. Suppose the 95% confidence interval for μ is (72, 84). Based on this confidence interval alone, in which of the following set(s) of hypotheses would the null hypothesis be rejected (at the 0.05 significance level)? A. $H_o: \mu = 65$ versus $H_a: \mu \neq 65$ B. $H_o: \mu = 75$ versus $H_a: \mu \neq 75$ C. both A. and B. D. neither A. nor B.

131. Failing to reject the null hypothesis implies:

- A. the null hypothesis is true B. the null hypothesis is false
- C. neither A. nor B. Matching.
- 132. Which of these statistical concepts is described in the following statement?
 - A. Central Limit Theorem
 - B. Law of Large Numbers
 - C. Sampling Variability
 - D. Statistical Inference

_____ The process of drawing conclusions about population characteristics from the facts given by a sample.

- 133. Assume the height of English setter dogs is normally distributed with a mean $\mu = 30$ inches and a standard deviation $\sigma = 3$ inches. What is the probability that the sample mean height of 9 randomly selected setters will be greater than 31.8 inches? Give 4 decimal places.
- 134. A study was conducted to see if the true mean grade point average (GPA) of students living off-campus differs from the university-wide true mean GPA of 2.65. Extensive records indicate that the standard deviation of GPAs is σ = 0.3. The researcher feels that it is reasonable to assume that the population of GPA scores is approximately normally distributed.
 - (a) State the null and alternative hypotheses.
 - (b) A random sample of 100 off-campus students had a mean GPA of $\bar{x} = 2:72$. Calculate the test statistic. Give 2 decimal places
 - (c) Calculate the p-value. Give 4 decimal places.
 - (d) What is the decision regarding the null hypothesis? Use $\alpha = 0:05$.
 - (e) Write a sentence stating the conclusion of the hypothesis test in the context of this problem. (f) The 95% confidence interval for μ is (2.66, 2.78). Provide a written interpretation of this 95% confidence interval in the context of this problem.
- 135. If the standard deviation σ and confidence level stay the same, then increasing the sample size will the width of the confidence interval for μ
 - A. increase
 - B. decreas
 - C not change
- 136. If the standard deviation σ and sample size stay the same, then increasing the confidence level will _______ the width the confidence interval for μ.
 - A. increase
 - B. decrease
 - C. not change
- 137. Male Body Temperature: What is the true mean body temperature for males? Medical researchers interested in this question collected data from a random sample of 35 males and found the sample mean was 98.4 degrees Fahrenheit. Assume the population standard deviation is σ = 0.9 degrees Fahrenheit

(a) Calculate a 95% confidence interval for the true mean body temperature for males. Give 4 decimal places.

(b) Interpret the 95% confidence interval calculated in part (a) in the context of this problem. (c) The standard body temperature that is often reported is 98.6 degrees Fahrenheit. State the appropriate hypotheses to answer the question "Do the data provide evidence that the true mean male body temperature is something other than 98.6 degrees Fahrenheit?".

(d) Use the 95% confidence interval in (a) to make a decision regarding the null hypothesis answered in (c) at the 0.05 significance level. You must explain how you made the decision to receive any credit.

19

- 147. If a 90% confidence interval for μ is (30, 36), what is the margin of error?
 - A. 6
 - B. 3
 - C. 33
 - D. 1.645
 - E. None of the above
- 148. The variability of a t distribution with 20 degrees of freedom is the variability of the standard normal distribution, N(0, 1).
 - A. greater than
 - B. less than
 - C. the same as
- 149. TRUE or FALSE: As the degrees of freedom increase, the t distribution approaches the standard normal (Z) distribution
- 150. With everything else held constant, which of the following p-values provides the strongest evidence against the null hypothesis?
 - A. 0.03
 - B. 0.45 C. 0.77
 - D. 0.99

151. A 95% confidence interval for a population mean will be computed based on a sample size of n = 15and sample standard deviation of s = 3. What t would you use for the interval?

- A. 1.96
- B. 2.131
- C. 2.145
- D. 1.761
- 152. A study was conducted to determine if hypnosis is effective in reducing pain. A simple random sample of eight subjects was selected to participate in this study. The sample average amount of pain before hypnosis was 8.7 and the sample average amount of pain after hypnosis was 5.6. The difference (before after) was calculated and the sample average difference was 3.1. What is the appropriate hypotheses to test? A. $H_0: \mu = 3.1$ versus $H_a: \mu > 3: 1$

 - B. $H_0: \mu = 5.6$ versus $H_a: \mu > 5.6$
 - C. $H_0: \mu = 8.7$ versus $H_a: \mu < 8.7$ D. $H_0: \mu = 0$ versus $H_a: \mu > 0$
- 153. Cocaine use: In a study of the effects of prenatal cocaine use on infants, the following random sample data were obtained for weights at birth: n = 190, *x̄* = 2700 grams, s = 645 grams. Test the claim that weights of babies born to cocaine users have a mean that is less than 3103 grams, the mean weight of babies born to mothers who do not use cocaine.

21

- (a) State the hypotheses to be tested. (b) What is the value of test statistic? Give 2 decimal places
- (c) Assuming H_a is true, give the distribution of the test statistic.
- (d) What is the p-value for this test? Give 4 decimal places
- (e) Using a 10% significance level, what is the decision regarding H_o ?
- (f) State the conclusion in the context of this problem

- 138. Acid Rain: The Environmental Protection Agency (EPA) is charged with monitoring the environ-Acid Kam: The Environmental Protection Agency (EPA) is charged with monitoring the environment. One aspect of this is keeping track of "acid rain", a broad term describing the fall of acid from the atmosphere. Acidity is measured on the pH scale, where pure water has a pH of 7. Suppose the EPA wishes to determine whether a particular area is subjected to acid rain (pH < 7). A random sample of size n = 50 was selected and the sample mean pH was 63. Assume the population standard deviation is 1.5. Let μ denote the true average pH of rain in this area.
 - (a) State the appropriate hypotheses to be tested. (b) Calculate the test statistic. Give 4 decimal places
 - (c) Calculate the p-value. Give 4 decimal places.

 - (d) Make a decision regarding the null hypothesis. Use the 5% significance level.
 - (e) State the conclusion in the context of this problem.
- 139. A sample of 25 observations is taken from a normal population with standard deviation 3. The 90% confidence interval centered at the sample mean of 30 is given by:
 - A. 30 ± 3.00
 - $B_{-30} \pm 0.60$
 - C. 30 ± 4.94
- D. 30 ± 0.99 140. In repeated constructions of 95% confidence intervals for μ , which of the following is the correct interpretation?
 - A. Approximately 95 out of 100 intervals contain μ .
 - B. 95 out of 100 populations will have their means in the interval.
 - C. Approximately 95 out of 100 intervals contain \bar{x}
 - D. None of the above
- 141. For the confidence interval $45 \pm 3 = (42, 48)$, which of the following is the margin of error?
 - A. 3
 - B. 6
 - C. 45 D. None of the above.
- 142. TRUE or FALSE: The larger the p-value, the stronger the evidence against ${\cal H}_o$
- 143. TRUE or FALSE: Failing to reject H_o implies H_o is true.
- 144. TRUE or FALSE: The p-value is the probability of the test statistic taking on a value at least as xtreme as the test statistic actually observed when the null hypothesis is tru
- 145. The width of a t confidence interval for the population mean (μ) is affected by changes in which of the following?
 - A. The size of the sample
 - B. The confidence level
 - C. The standard deviation of the sample
 - D. The sample mean E. A, B, and C
- 146. The test statistic for the hypothesis test of $H_0: \mu = 5 \text{versus} H_a: \mu > 5$ is t = 1.20. The p-value for this test is A, P(T = 5).

 - B. P(T = 1.20) if $\mu = 5$.
 - C. P(T ; 1.20) if $\mu = 5$. D. P(T ; 1.20 or T ; 1.20) if $\mu = 5$.

20

- 154. Suppose the sample standard deviation is held constant. The standard error of the sample mean as the sample size increases.
 - A. increases
 - B. decreases
 - C. remains unchanged

D. All of the above.

155. It is considered healthy for people to have cholesterol levels below 200. A researcher would like to know if people have healthy cholesterol levels, on average. A random sample of 30 individuals was selected and their sample mean cholesterol level was found to be 193. What are the appropriate hypotheses?

156. Suppose the 95% confidence interval for μ is (68.824, 71.176). Based on the 95% confidence interval,

157. Weight of babies: A researcher is interested in the weight of babies from mothers who smoked more than 1 pack per day during their pregnancy. He takes a random sample of 26 babies from mothers who smoked more than 1 pack per day. The mean birthweight for the sample was 3.48 kilograms with a sample standard deviation of 0.8 kilograms. Assume the birthweight of all babies from mothers who

(b) Provide a written interpretation of the 90% confidence interval in the context of this problem.

158. Speedy driving: The local police chief believes that cars traveling on the interstate are driven at speeds higher than the posted speed limit (75 miles per hour). A random sample of 64 cars passing a check point on a certain section of the interstate showed a sample mean speed of 81 miles per hour with a sample standard deviation of 5 miles per hour.

(c) Assuming H_o is true, give the distribution of the test statistic for this specific problem.

22

A. $H_o: \mu = 193$ versus $H_a: \mu < 193$ B. $H_o: \mu = 200$ versus $H_a: \mu < 200$ C. $H_o: \bar{x} = 193$ versus $H_a: \bar{x} < 193$

D. $H_o: \bar{x} = 200$ versus $H_a: \bar{x} < 200$

which of the following is (are) correct?

(a) State the appropriate hypotheses.

(d) What is the p-value for this test?

A. Reject $H_o: \mu = 71$ in favor of $H_a: \mu \neq 71$ at $\alpha = 0.05$

B. Reject $H_o: \mu=72$ in favor of $H_a: \mu\neq72$ at $\alpha=0.05$

C. Reject $H_o: \mu = 69$ in favor of $H_a: \mu \neq 69$ at $\alpha = 0.05$

smoked more than 1 pack per day is approximately normally distributed. (a) Calculate the 90% confidence interval for μ . Round your answer to 2 decimal places

(b) What is the value of test statistic? Round your answer to 1 decimal place.

(e) Using a 10% significance level, what is the decision regarding H_o ?

(f) State the conclusion in the context of this problem.