

Use a pencil. Be neat. Show all pertinent work.
Circle the best answer or fill in the blanks.

1. A statistician took a random sample of 20 newborn babies at City General Hospital. The sample provided the following statistics (in lb): $\bar{x} = 7.26$ and $s = 1.13$. Construct a 95% confidence interval for the mean weight (in lb.) of all babies born at City General Hospital in recent times? (Assume the population of baby weights has a normal distribution.) We are about 95% certain that the average weight (in lb) of all babies born at the hospital falls in the interval...

2. A nutritionist wants to estimate the mean amount of cholesterol in a certain variety of chicken eggs. She wants to be within 4 mg with 99% confidence. It is believed that the standard deviation is 23 mg. How large a sample of eggs should she use?

3. A political candidate wants to estimate his chances of winning the coming election for governor. Out of a random sample of 1100 voters, 672 voters stated they supported the candidate. Find the 99% confidence interval for p , the true proportion of supporters.

4. Which confidence level below would give the smallest confidence interval for a population mean?
a. 90% b. 95% c. 97% d. 98% e. 99%

5. A random sample of 200 females provided the following sample statistics:

sample mean body temperature:	$\bar{x} = 98.33^\circ$
sample standard deviation of body temperatures:	$s = .72^\circ$

Find the margin of error E for a 90% confidence interval for the mean body temperature of all females in the population that was sampled.

6. Suppose a 95% confidence interval for the mean heart rate (beats/min) of a particular population was (69.7, 74.5). Which one of the following statements is correct?

- (a) Ninety-five percent of the population has a heart rate somewhere between 69.7 and 74.5.
- (b) Five percent of the population has a heart rate outside the range 69.7 to 74.5.
- (c) Ninety-five percent of the time each person's heart has a rate somewhere between 69.7 and 74.5.
- (d) Ninety-five percent of the population has an average heart rate and five percent does not.
- (e) We are 95% certain that average heart rate of the population is between 69.7 and 74.5.

7. Jane wants to find a 99% confidence interval for the mean μ of a normal population with unknown standard deviation σ . If the sample size is 20, what critical value would she use?

8. A quality control expert wants to estimate the percentage of defective components that are being manufactured by his company to within 1.0 %. A preliminary sample of 100 components showed that 5 were defective. How large a sample is needed to estimate the true proportion of defective components with 95% confidence? (Note 1% \rightarrow .01 in terms of proportion.)

9. A machine that fills milk bottles is supposed to fill each bottle with a mean amount of milk equal to 64 ounces. An operator suspects that the true mean is less than 64 ounces. If a statistical hypothesis test is to be performed, how should the hypotheses be stated? Let μ represent the true mean amount of milk.

- a. $H_0: \mu < 64$ vs. $H_a: \mu = 64$
- b. $H_0: \mu < 64$ vs. $H_a: \mu \geq 64$
- c. $H_0: \mu = 64$ vs. $H_a: \mu \neq 64$
- d. $H_0: \mu = 64$ vs. $H_a: \mu < 64$
- e. $H_0: \mu = 64$ vs. $H_a: \mu > 64$

10. A machine that fills milk bottles is supposed to fill each bottle with a mean amount of milk equal to 64 ounces. An operator suspects that that the true mean is less than 64 ounces. One hundred bottles are randomly checked and their mean is found to be 63.91 ounces, with the sample standard deviation being 0.49 ounces. If a statistical hypothesis test is performed, what is the p -value (or observed level of significance)?

- a. .01
- b. .03
- c. .04
- d. .05
- e. .07

11. A machine that fills milk bottles is supposed to fill each bottle with a mean amount of milk equal to 64 ounces. An inspector suspects that that the true mean is less than 64 ounces. One hundred bottles are randomly checked and their mean is found to be 63.91 ounces, with the sample standard deviation being 0.49 ounces. If a statistical hypothesis test is performed, using a significance level of .05, what is the proper conclusion?

- a. There is sufficient evidence at the .05 level of significance to conclude that $\mu < 64$ ounces.
- b. There is sufficient evidence at the .05 level of significance to conclude that $\mu = 64$ ounces.
- c. There is not sufficient evidence at the .05 level of significance to conclude $\mu < 64$ ounces.
- d. There is not sufficient evidence at the .05 level of significance to say that $\mu = 64$ ounces.
- e. A larger sample is needed if we want to perform this test.

12. A machine that fills milk bottles is supposed to fill each bottle with a mean amount of milk equal to 64 ounces. Find a 90% confidence interval for μ , the true mean, given that 100 bottles are randomly checked and their mean is found to be 63.91 ounces, with the sample standard deviation being 0.49 ounces. Which one of the statements below is true?

- a. The confidence interval is totally below the number 64.
- b. The confidence interval is totally above the number 64.
- c. The confidence interval contains the number 64.
- d. The confidence interval is centered around 64.
- e. None of the above statements are true.

13. A manufacturer claims that no more than 3% of the widgets it ships out to wholesalers are "defective". A wholesaler finds 15 defective widgets in a random sample of 300 widgets from the last shipment of 100,000 widgets. Let p denote the proportion of defective in the whole shipment of 100,000. Using $\alpha = .05$, what is the proper conclusion for the hypothesis test performed by the wholesaler.

- (a) At the .05 level of significance, there is sufficient evidence to conclude that $p > .03$.
- (b) At the .05 level of significance, there is sufficient evidence to conclude that $p \leq .03$.
- (c) At the .05 level of significance, there is not sufficient evidence to conclude that $p > .03$.
- (d) At the .05 level of significance, there is not sufficient evidence to conclude that $p \leq .03$.
- (e) No conclusion can be drawn from a random sample of only 300.

14. In hypothesis testing, if the p -value is less than the level of significance α , we

- a. have committed a Type I error
- b. have committed a Type II error
- c. have sufficient evidence to reject H_0
- d. do not have sufficient evidence to reject H_0
- e. have increased the power of the test

15. Convicting an innocent person is analogous to

- a. committing a Type I error
- b. committing a Type II error
- c. increasing the level of significance
- d. increasing the power of the test
- e. taking an introductory statistics course

16. When you use a larger value for α , what type of error becomes more likely?

- a. Type I error
- b. Type II error
- c. Typo error
- d. Bowan error
- e. Bygone error

17. When performing a hypothesis test, increasing the sample size n while keeping a fixed level of significance α , increases the *power* of the test.

TRUE FALSE