1. The time that a technician requires to perform preventive maintenance on air conditioning unit is governed by the exponential distribution with mean time one hour. Your company has a contract to maintain 70 of these units in an apartment building. What is the probability that the average maintenance time exceeds 75 minutes?

a. 0.0183
b. 0.0000
c. 0.0813
d. 0.2860
e. 0.9817

2. A normal population has mean 100 and variance 25. How large must the random sample be if you want the standard error of the sample mean to be 1.5?

a. 11.11
b. 25
c. 16.67
d. 3.33
e. 277.78

3. Let $X_1,\ldots, X_{100}$ be a random sample from an exponential distribution with mean ½. Determine the approximate value of $P[\sum_{i=1}^{100} X_i > 57]$ using the Central Limit Theorem.

a. 0.0808
b. 0.1616
c. 0.3142
d. 0.3854
e. 0.4693

4. The compressive strength of concrete is normally distributed with $\mu = 2500$ psi and $\sigma = 50$ psi. Find the probability that a random sample of $n = 5$ specimens will have a sample mean strength that falls in the interval from 2499 psi to 2510 psi.

a. 0.1896
b. 0.6736
c. 0.4840
d. 0.4025
e. 0.1576

5. The sampling distribution of the mean is a distribution of

a. statistics.
b. individual population values
c. individual sample values
d. parameters
e. probabilities

6. For a normal population with known variance σ^2, what is the confidence level for the interval $\bar{x} - 2.5\frac{\sigma}{\sqrt{(n)}} \leq \mu \leq \bar{x} + 2.5\frac{\sigma}{\sqrt{(n)}}$?

a. 0.9876
b. 0.9938
c. 0.0048
d. 0.9904
e. 0.0062

7. The yield of a chemical process is being studied. From previous experience, yield is known to be normally distributed and $\sigma = 3$. The past five days of plant operation have resulted in the following percent yields: 91.6, 88.75, 90.8, 89.95, and 91.3. Find a 95% two-sided confidence interval on the true mean yield.

a. $87.85 \leq \mu \leq 93.11$
b. $88.75 \leq \mu \leq 91.60$
c. $89.95 \leq \mu \leq 91.30$
d. $87.50 \leq \mu \leq 92.01$
e. $88.27 \leq \mu \leq 92.69$

8. A random sample of 72 statistics students was taken to estimate the proportion of students who also were in the Math Club. The 90% confidence interval was 0.438 to 0.642. Using this information, what size sample would be necessary to estimate the true proportion to within 0.08 using 95% confidence?

a. 150
b. 105
c. 420
d. 597
e. 1000

9. The brightness of a television picture tube can be evaluated by measuring the amount of current required to achieve a particular brightness level. A sample of 20 tubes results in $\bar{X} = 317.2$ and s = 15.7. Find the margin of error for a 99% confidence interval on mean current required.

a. 10.0435
b. 10.9958
c. 8.9152
d. 9.0398
e. 8.1797

10. The produce manager for a large retail food chain is interested in estimating the percentage of potatoes that arrive on a shipment with bruises. A random sample of 150 potatoes showed 14 with bruises. Based on this information, what is the margin of error for a 95 percent confidence interval estimate?

a. 0.0466
b. 0.0933
c. 0.0006
d. 0.0715
e. Can't be determined without knowing σ.

11. Let x_1, x_2, x_3, x_4 be the values of a random sample from a normal distribution with unknown mean and unknown variance $\sigma^2 > 0$. The null hypothesis $H_0: \mu = 10$ is to be tested against the alternative $H_1: \mu \neq 10$ at a significance level size of 0.05 using the Student's t-statistics. If the resulting sample mean is $\bar{x} = 15.84$ and $s^2 = \frac{1}{3}\sum(x_i - \bar{x})^2 = 16$, then what are the critical t-value and the decision reached?

a. t = 3.18; do not reject H_0
b. t = 2.13; reject H_0
c. t = 2.35; do not reject H_0
d. t = 2.78; reject H_0
e. t = 3.18; reject H_0

12. A quality control manager believes that there are too many defective light bulbs being produced, higher than the advertised rate. The manager's null hypothesis is that the production line of light bulbs has a defect rate of p = 0.025 (the light bulb's stated defect

rate). He does a hypothesis test with a significance level of 0.05. Symbolically, the null and alternative hypothesis are as follows: H_0: $p = 0.025$ and H_a: $p > 0.025$.

Choose the statement that best describes the significance level in the context of the hypothesis test.

a. The significance level of 0.05 is the probability of concluding that the defect rate is higher than 0.025 when in fact the defect rate is equal to 0.025.
b. The significance level of 0.05 is the defect rate we believe is the true defect rate.
c. The significance level of 0.05 is the probability of concluding that the defect rate is equal to 0.025 when in fact it is greater than 0.025.
d. The significance level of 0.05 is the test statistic that we will use to compare the observed outcome to the null hypothesis.
e. All are true.

13. The supervisor of a production line believes that the average time to assemble an electronic component is 14 minutes. Assume that assembly time is normally distributed with a standard deviation of 3.4 minutes. The supervisor times the assembly of 14 components, and finds that the average time for completion was 11.6 minutes.
Using the p-value, which of the following statements is most accurate?

a. Reject the null hypothesis at $\alpha = 0.0083$.
b. Unable to reject the null hypothesis at $\alpha \leq 0.10$.
c. Reject the null hypothesis at $\alpha = 0.025$, but not at $\alpha = 0.05$.
d. Reject the null hypothesis at $\alpha = 0.05$, but not at $\alpha = 0.01$.
e. None of the answers is true

14. In an experiment to determine if two products are equally liked by consumers, a sample of 1000 randomly selected consumers found that 515 favored product A. To perform an appropriate test of hypothesis at 1% level of significance, the observed test statistic equals

a. 0.9494
b. 0.0513
c. 0.5000
d. 0.5150
e. 0.6163

15. The supervisor of a production line believes that the average time to assemble an electronic component is 14 minutes. Assume that assembly time is normally distributed with a standard deviation of 3.4 minutes. The supervisor times the assembly of 14 components, and finds that the average time for completion was 11.6 minutes. What are the appropriate null and alternative hypotheses?

a. $H_0: \mu = 14$ and $H_1: \mu \neq 14$
b. $H_0: \mu \geq 14$ and $H_1: \mu < 14$
c. $H_0: \mu \leq 14$ and $H_1: \mu > 14$
d. $H_0: \mu \neq 14$ and $H_1: \mu = 14$
e. $H_0: \mu > 14$ and $H_1: \mu < 14$

16. A hypothesis test is to be conducted using an alpha = .01 level. This means:

a. There is a maximum 1 percent chance that a true null hypothesis will be rejected.
b. There is a 1 percent chance that the alternative hypothesis is true.
c. There is a 99 percent chance that a Type II error has been committed.
d. There is a 1 percent chance that the null hypothesis is true.
e. There is a maximum 1 percent chance that a false null hypothesis will be accepted.