Use the following sample data to answer questions 1 and 2.

\[-1, 1, 3\]

1. The sample mean and standard deviation, \((\bar{x}, s)\).
   a) \((0, 1)\)  
   b) \((1, 1)\)  
   c) \((1, 2)\)  
   d) \((1, 3)\)  
   e) \((1, 4)\)

2. How many standard deviations is 3 away from the mean?
   a) 1  
   b) 4  
   c) 9  
   d) 16  
   e) 25

3. The test scores of 15 employees enrolled in a CPR training course are listed below. Find the first, second, and third quartiles \((Q_1, Q_2, Q_3)\) of the test scores.

\[13 \ 9 \ 18 \ 15 \ 14 \ 21 \ 7 \ 10 \ 11 \ 20 \ 5 \ 18 \ 37 \ 16 \ 17\]

   (a) \((9 \ 16 \ 20)\)
   (b) \((10 \ 15 \ 18)\)
   (c) \((11 \ 17 \ 21)\)
   (d) \((9 \ 16 \ 21)\)
   (e) \((18 \ 21 \ 37)\)

Use the following information to answer questions 4 and 5.

According to the records of a major hospital, the birth weights of newborns has a symmetric and bell-shaped frequency distribution with a mean of 6.8 pounds and a standard deviation of 0.5 pound.

4. Approximately, what percent of newborn babies weigh under 6.3 pounds?
   (a) 50%
   (b) 2.5%
   (c) 95%
   (d) 68%
   (e) 16%
5. If the $z$-score corresponding to the weight of a newborn baby is 3, which of the following statements best describes the newborn’s weight?

(a) This is a very heavy baby in comparison to other newborn babies.
(b) This is a very light baby in comparison to other newborns.
(c) This is an average weight baby.
(d) This is a somewhat below average weight baby.
(e) One cannot make any statement since only the $z$-score corresponding to the weight is given.

Use the following information for questions 6 and 7.

Six months before election, the pool of mayoral candidates in a major city has narrowed to the following 6 candidates:

- JM (James McDonald – Republican)
- BO (Benjamin O’Brien – Democrat)
- HC (Helen Clifford – Democrat)
- W1 (Wildcard – Democrat)
- W2 (Wildcard – Republican)
- W3 (Wildcard – Independent)

Their respective probabilities of being elected into the office are provided below:

<table>
<thead>
<tr>
<th>Party Affiliation</th>
<th>Democratic</th>
<th>Republican</th>
<th>Independent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Candidate</td>
<td>BO 0.60</td>
<td>HC 0.10</td>
<td>W1 0.02</td>
</tr>
</tbody>
</table>

6. Find the probability that an Independent candidate will be voted into the office.
   a) 0.00 b) .11 c) 0.50 d) 0.05 e) 0.04

7. Find the probability that a Democratic candidate will be voted into the office.
   a) 0.50 b) 0.33 c) 0.17 d) 0.72 e) 0.95
8. In an experiment of tossing a fair coin, we let $x = 1$ represent “observe a head on the coin” and $x = 0$ “observe a tail on the coin”. Which of the following tables represents the resulting probability distribution?

(a) $\begin{array}{c|c|c}
\text{x} & 0 & 1 \\
\hline
\text{p(x)} & 1/2 & 1/2 \\
\end{array}$

(b) $\begin{array}{c|c|c}
\text{x} & 0 & 1 \\
\hline
\text{p(x)} & 1/3 & 2/3 \\
\end{array}$

(c) $\begin{array}{c|c|c}
\text{x} & 0 & 1 \\
\hline
\text{p(x)} & 1/2 & 2/3 \\
\end{array}$

(d) $\begin{array}{c|c|c}
\text{x} & 0 & 1 \\
\hline
\text{p(x)} & 2/3 & 1/2 \\
\end{array}$

(e) By the Central Limit Theorem, the probability distribution is approximately normal.

Use the following information to answer questions 9 and 10.
A bank records the number of ATM transactions made by its customers in one day. The number $x$ of daily ATM transactions per customer can be approximated by the following probability distribution.

$\begin{array}{c|c|c|c|c|c|c|c}
\text{x} & 0 & 1 & 2 & 3 & 4 & 5 & 6 \\
\hline
\text{p(x)} & 0.22 & 0.28 & 0.20 & 0.12 & 0.09 & 0.07 & 0.02 \\
\end{array}$

9. Find the mean number of the daily ATM transactions per customer.

(a) 2.4 
(b) 1.0 
(c) 1.3 
(d) 1.9 
(e) 2.6

10. Find the standard deviation deviation of the daily ATM transactions per customers.

(a) 2.4 
(b) 1.0 
(c) 1.3 
(d) 1.9 
(e) 2.6
11. If $z$ denotes the standard normal random variable, $P(-.54 < z \leq .78)$ is closest to
   a) 0.2054    b) 0.0769    c) 0.4877    d) 0.2823    e) 0.6877

12. The amount of time $x$ in hours spent each week watching television by children under
twelve is normally distributed with mean 24.5 hours and standard deviation 6.23 hours. The probability that a randomly selected child under twelve spends at least
30 hours each week is closest to
   a) 0.88    b) 0.31    c) 0.19    d) 0.70    e) 0.81

Use the following information to answer questions 13 and 14.
The mean room and board expense per year at a four-year college is $6850 with a standard
deviation of $1200. You randomly select 36 four-year colleges and consider the sample
mean $\bar{x}$.

13. Which of the following statements regarding the distribution of $\bar{x}$ is correct ?
   (a) $\bar{x}$ is approximately normally distributed with mean $\mu_x = 6850$ and standard
deviation $\sigma_{\bar{x}} = 200$
   (b) $\bar{x}$ is approximately normally distributed with mean $\mu_x = 6850$ and standard
deviation $\sigma_{\bar{x}} = 7200$
   (c) $\bar{x}$ is approximately normally distributed with mean $\mu_x = 200$ and standard de-
   viation $\sigma_{\bar{x}} = 6850$
   (d) $\bar{x}$ is approximately normally distributed with mean $\mu_x = 6850$ and standard
deviation $\sigma_{\bar{x}} = 1200$
   (e) None of the above.

14. The probability that the mean room and board is less than $7000 is about.
   (a) 0.88.
   (b) 0.7734
   (c) 0.8106
   (d) 0.7506
   (e) 0.1977
15. The advertising department of a nationally circulated magazine wishes to estimate the mean age of its subscribers to within 0.5 year with 90% confidence. If they estimate that the standard deviation of the ages of their subscribers is 5 years, find the required sample size.

(a) 17  
(b) 165  
(c) 45  
(d) 271  
(e) 13

16. The length of time employees have worked at a corporation is normally distributed with a mean of 11.2 years and a standard deviation of 2.5 years. In a company cutback, the lowest 10% in seniority are to be laid off. What is the maximum length of time an employee could have worked and still be laid off?

(a) 10  
(b) 9  
(c) 8  
(d) 7  
(e) 6

17. You randomly select 10 mortgage lenders and determine the current mortgage interest rate at each. The sample mean rate is 5.9% with a sample standard deviation of 0.4%. Assuming that the interest rates are approximately normally distributed, a 95% confidence interval for the population mean mortgage interest rate is closest to

(a) 5.67 < μ < 6.23  
(b) 5.61 < μ < 6.19  
(c) 5.76 < μ < 6.08  
(d) 5.65 < μ < 6.15  
(e) 5.70 < μ < 6.11

18. In order to estimate the proportion of all credit card holders who pay all their credit card bills in full each month, a credit counseling bureau took a random sample of 450 credit card holders and found that 127 pay all their credit card bills in full each month. A 99% confidence interval for the proportion of all credit card holders who pay all their credit card bills in full each month is closest to

(a) .282 ± .050  
(b) .282 ± .027  
(c) .282 ± .042  
(d) .282 ± .035  
(e) .282 ± .055
Use the following information to answer questions 19, 20, and 21.

A medical researcher claims that less than 20% of all adults in the United States are allergic to a medication. In a random sample of 125 adults in the United States, 18 say they have such an allergy.

19. State the correct null and alternative hypotheses to check the researcher’s claim.

   (a) \( H_0 : p < .20 \) vs. \( H_a : p \geq .20 \)
   (b) \( H_0 : p = 20 \) vs. \( H_a : p \neq 20 \)
   (c) \( H_0 : p > .20 \) vs. \( H_a : p \leq .20 \)
   (d) \( H_0 : p \geq .20 \) vs. \( H_a : p < .20 \)
   (e) \( H_0 : \hat{p} < .20 \) vs. \( H_a : \hat{p} \geq .20 \)

20. Find the value of the standardized test statistic.

   (a) \( z = 1.56 \)
   (b) \( z = .20 \)
   (c) \( z = -1.56 \)
   (d) \( z = -2.32 \)
   (e) \( z = 1.34 \)

21. The \( p- \) value of the test is closest to

   (a) .4099
   (b) .9406
   (c) .06
   (d) .4406
   (e) .0901.

22. Given that the \( p- \) value for a test of hypothesis is \( p = .0323 \), then at the significance level \( \alpha = .05 \), which of the following statements is the correct decision?

   (a) Reject \( H_0 \) because \( \alpha \) is less than \( p \).
   (b) Do not reject \( H_0 \) because \( p \) is less than \( \alpha \).
   (c) Do not reject \( H_0 \) because \( \alpha \) is less than \( p \).
   (d) Reject \( H_0 \) because \( p \) is less than \( \alpha \).
   (e) No decision can be made because there is not enough information.
23. Suppose that we draw a random sample of 35 observations from a population and test, at \( \alpha = .05 \), \( H_0 : \mu \leq 24 \) vs \( H_a : \mu > 24 \). Which of the following is the correct rejection region?

(a) \( z > 1.96 \)
(b) \( z < -1.645 \)
(c) \( t > 1.282 \)
(d) \( z > 2.326 \)
(e) \( z > 1.645 \)

Use the following information for questions 24 and 25

A recent study in North Carolina was interested in determining whether there is a difference in mean annual contributions (in dollars) for individuals covered by tax-sheltered annuities (TSA); and those with 401(k) retirement programs. The leaders of the study collected the following data. Let

\( \mu_1 \) = Mean dollars invested by TSA-eligible population during the last year
\( \mu_2 \) = Mean dollars invested by 401(k)-eligible population during the last year

Assume that each population is normally distributed.

<table>
<thead>
<tr>
<th>TSA-Eligible</th>
<th>401(k)-Eligible</th>
</tr>
</thead>
<tbody>
<tr>
<td>( n_1 = 15 )</td>
<td>( n_2 = 15 )</td>
</tr>
<tr>
<td>( \bar{x}_1 = $2,119.70 )</td>
<td>( \bar{x}_2 = $1,777.70 )</td>
</tr>
<tr>
<td>( s_1 = $709.70 )</td>
<td>( s_2 = $593.90 )</td>
</tr>
</tbody>
</table>

24. Specify the null and alternative hypotheses to determine whether there is a difference between the two means.

(a) \( H_0 : \mu_1 > \mu_2 \) vs \( H_a : \mu_1 \leq \mu_2 \)
(b) \( H_0 : \mu_1 \geq \mu_2 \) vs \( H_a : \mu_1 < \mu_2 \)
(c) \( H_0 : \mu_1 \leq \mu_2 \) vs \( H_a : \mu_1 > \mu_2 \)
(d) \( H_0 : \mu_1 = \mu_2 \) vs \( H_a : \mu_1 \neq \mu_2 \)
(e) \( H_0 : \bar{x}_1 \geq \bar{x}_2 \) vs \( H_a : \bar{x}_1 < \bar{x}_2 \)

25. For the above test of hypothesis and data, the correct formula for calculating the standardized test statistic is

(a) \( z = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{s_1^2/n_1 + s_2^2/n_2}} \)
(b) \( t = \frac{d - \mu_0}{s_d/\sqrt{n}} \)
(c) \( t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2} / (n_1 + n_2 - 2) \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \)
(d) \( z = \frac{\bar{x} - \mu}{s/\sqrt{n}} \)
(e) \( t = \frac{\bar{x} - \mu}{s/\sqrt{n}} \)

26. In a simple linear regression study between two variables $x$ (the independent variable) and $y$ (the dependent variable), a random sample is collected and the coefficient of correlation $r = -0.76$ is calculated. Which of the following conclusions may be made?

(a) $x$ and $y$ are almost perfectly linearly correlated, and $y$ increases as $x$ is increased.
(b) $x$ and $y$ are almost perfectly linearly correlated, and $y$ decreases as $x$ is increased.
(c) $x$ and $y$ are moderately linearly correlated, and $y$ decreases as $x$ is increased.
(d) $x$ and $y$ are moderately linearly correlated, and $y$ increases as $x$ is increased.
(e) $x$ and $y$ are very poorly correlated.