1. What probability value would be needed to complete the following probability distribution table?

<table>
<thead>
<tr>
<th>$x$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(x)$</td>
<td>$1/6$</td>
<td>$1/12$</td>
<td>$1/3$</td>
<td>$1/4$</td>
<td></td>
</tr>
</tbody>
</table>

(a) $1/3$  (b) $1/4$  (c) $1/6$  (d) $1/12$  (e) $1/8$

2. Let $X$ denote the high temperature in Murfreesboro on October 31, 2006 and let $Y$ denote the number of rainy days in Murfreesboro during November, 2006. Which one of the following statements is true?

(a) Both $X$ and $Y$ are discrete random variables.
(b) Both $X$ and $Y$ are continuous random variables.
(c) $X$ is a discrete random variable and $Y$ is a continuous random variable.
(d) $X$ is a continuous random variable and $Y$ is a discrete random variable.
(e) none of the above

3. What is the mean of the random variable with following probability distribution?

<table>
<thead>
<tr>
<th>$x$</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(x)$</td>
<td>$0.20$</td>
<td>$0.10$</td>
<td>$0.20$</td>
<td>$0.40$</td>
<td>$0.10$</td>
</tr>
</tbody>
</table>

(a) 2.0  (b) 2.1  (c) 2.2  (d) 2.3  (e) none of the previous

4. A student randomly and independently guesses the answers for 20 multiple-choice questions. Each question has 5 possible choices. Find the mean and standard deviation for $X$, the number of questions the student answers correctly? (Hint: $X$ has a binomial distribution.)

(a) $\mu = 4$ and $\sigma = \sqrt{3.2}$  
(b) $\mu = 5$ and $\sigma = \sqrt{4.0}$
(c) $\mu = 10$ and $\sigma = \sqrt{20}$  
(d) $\mu = 4$ and $\sigma = \sqrt{1.79}$
(e) $\mu = 10$ and $\sigma = 20/25$

5. A certain standard test has a mean score of 500 and a standard deviation of 75. A very large proportion of the students taking this test score within two standard deviations of the mean. In other words, almost all of the students score between ...

(a) 500 and 575  
(b) 500 and 650  
(c) 400 and 600  
(d) 475 and 575  
(e) 350 and 650
6. If 33% of all voters in a large country give the president a favorable performance rating, what is the probability that exactly 6 of 20 randomly selected voters give the president a favorable rating? (Hint: The number of favorable ratings out of 20 is a binomial random variable.)

(a) .083  (b) .492  (c) .500  (d) .184  (e) .325

7. If 33% of all voters in a large country give the president a favorable performance rating, what is the probability that 6 or less of 20 randomly selected voters give the president a favorable rating?

(a) .500  (b) .184  (c) .492  (d) .083  (e) .325

8. A gambler pays $12 dollars to play the following game. A card is randomly dealt from a deck of cards. If the card is an ace the “house” pays the player $40. If the card is a face card, the house pays the gambler $15. If the card value is 2 through 10, the house pays $5 to the gambler. If $X$ denotes the net profit per play for the house, use the following table to find the expected net profit per play for the house.

<table>
<thead>
<tr>
<th>$x$ (net profit for house)</th>
<th>$-28$</th>
<th>$-3$</th>
<th>$7$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$P(x)$</td>
<td>4/52</td>
<td>12/52</td>
<td>36/52</td>
</tr>
</tbody>
</table>

(a) $4.00$  (b) $2.00$  (c) $1.17$  (d) $2.15$  (e) $3.33$

9. (True/False). In a binomial experiment, the probability of “success” always equals the probability of “failure”.

True  False

10. (True/False). If a fair coin is flipped 20 times, it would be considered unusual to obtain 16 or more "heads".

True  False

11. Which of the following does not characterize a normal distribution?

a. the mean is greater than the median  
b. symmetry  
c. support on all the real numbers  
d. the approximate distribution of a sample mean from a large random sample  
e. almost all of the probability is within 3 standard deviations of the mean

12. If $Z$ has standard normal distribution, then find $P(1 < Z < 3)$, rounded to decimal places.

a. .16  b. .34  c. .49  d. .68  e. .82
13. If the weight of newborn babies at City General Hospital has a normal distribution with mean 7.25 lb and standard deviation 1.07 lb, find the probability that a randomly selected newborn baby from the hospital has a weight between 5 and 8 lb.

   a. .287   b. .538   c. .697   d. .741   e. .814

14. If the weight of newborn babies at City General Hospital has a normal distribution with mean 7.25 lb and standard deviation 1.07 lb, find the weight for the 25th percentile.

   a. 5.76 lb   b. 5.95 lb   c. 6.53 lb   d. 6.92 lb   e. 7.01 lb

15. If the weight of newborn babies at City General Hospital has a normal distribution with mean 7.25 lb and standard deviation 1.07 lb, find the probability that mean weight of 100 randomly selected babies from the hospital is less than 7.00 lb.

   a. .459   b. .408   c. .223   d. .152   e. .010

16. Suppose the random variable $X$ has a binomial distribution with $n = 10000$ and $p = 0.25$. Use the normal distribution to approximate the probability $P(X \leq 2485)$.

   a. .24   b. .36   c. .48   d. .60   e. .72

17. (TRUE/FALSE). Prior to taking a random sample from a population with mean $\mu$ and standard deviation $\sigma$, the sample mean $\bar{X}$ is a random variable with mean $\mu$ and standard deviation $\sigma/\sqrt{n}$.

   True   False

18. (TRUE/FALSE). For a sample size of 2 or greater, the standard deviation of $\bar{X}$ is greater than the standard deviation of the population.

   True   False

19. (TRUE/FALSE). If a population has mean $\mu$, then the sample mean $\bar{X}$ is a biased estimator of $\mu$.

   True   False

20. (TRUE/FALSE) The central limit theorem states that the sample mean has an approximate normal distribution only if the sample size is large and the population sampled is normal.

   True   False