

1. If a random variable has the normal distribution with  $\mu = 80.0$  and  $\sigma = 4.8$ , find the probability that it will take on a value greater than 76.4.
- a. .7257      b. .2266      c. .7500      d. .2743      e. .7734
2. In a given city, medical expenses are given as the reason for  $\frac{3}{4}$  of all personal bankruptcies. What is the probability that medical expenses will be given as the reason for two of the next four personal bankruptcies filed in that city?
- a.  $\frac{9}{16}$       b.  $\frac{9}{256}$       c.  $\frac{27}{256}$       d.  $\frac{27}{128}$       e.  $\frac{81}{128}$
3. It is known that 20 percent of all persons given a certain medication get drowsy within two minutes. Find the probability that among fourteen persons given the medication at most one will get drowsy within two minutes.
- a.  $1 - \left[ \binom{14}{0} (.2)^0 (.8)^{14} + \binom{14}{1} (.2)^1 (.8)^{13} \right]$       b.  $\binom{14}{1} (.2)^1 (.8)^{13}$
- c.  $\binom{14}{0} (.2)^0 (.8)^{14} + \binom{14}{1} (.2)^1 (.8)^{13}$       d.  $1 - \binom{14}{1} (.2)^1 (.8)^{13}$
- e.  $14 \cdot .2 \cdot (.8)^{13}$

4. If the assembly time of an "easy to assemble" toy is a random variable having a normal distribution with  $\mu = 12.8$  minutes and  $\sigma = 4.0$  minutes, what is the probability that this kind of toy can be assembled in less than 10 minutes?
- a. .2580    b. .7580    c. .2743    d. .2420    e. .2119
5. Use the normal distribution to approximate the probability of getting at most 7 heads in 16 flips of a balanced coin.
- a. .4013    b. .3085    c. .2266    d. .5987    e. .7734
6. Two-thirds of the people in a town oppose an upcoming bond issue. Eighteen people are selected at random. Use the normal approximation to estimate the probability that exactly twelve of them oppose the bond issue.
- a. .5987    b. .1974    c. .4013    d. .5000    e. 0.000
7. The length of life of a certain type of refrigerator is normally distributed with a mean of 4.8 years and a standard deviation of 1 year. What period of time should the manufacturer give as a guarantee if he is willing to replace only 0.5 percent of the machines?
- a. 6.45 yrs.    b. 2.6 yrs.    c. 7.4 yrs.    d. 3.15 yrs.    e. 2.2 yrs.

8. What is the equation of a line that passes through (4,3) with slope  $\frac{1}{2}$  ?

a.  $y = \frac{1}{2}x + 3$

b.  $y = \frac{1}{2}x + 1$

c.  $y = \frac{3}{4}x + \frac{1}{2}$

d.  $y = 4x + 3$

e.  $y = \frac{1}{2}x + 4$

9.

The unshaded region is the feasible set (i.e. set of solutions) for which set of inequalities?

a.  $y \geq \frac{3}{2}x$

b.  $y \leq \frac{3}{2}x$

c.  $y \leq \frac{3}{2}x$

$y \leq \frac{1}{2}x - 4$

$y \leq -\frac{1}{2}x + 4$

$y \geq -\frac{1}{2}x + 4$

d.  $y \geq \frac{3}{2}x$

e.  $y \geq \frac{2}{3}x$

$y \leq -\frac{1}{2}x + 4$

$y \leq -\frac{1}{2}x + 4$

10. What is the y-intercept of a line that passes through  $(-4, -3)$  and is perpendicular to  $y = 2x - 3$ ?

- a.  $-3$       b.  $-5\frac{1}{2}$       c.  $-1$       d.  $-11$       e.  $-5$

11. The matrix  $\begin{bmatrix} -1 & 1 & -1 \\ 2 & -1 & 3 \\ 2 & 0 & 6 \end{bmatrix}$  is pivoted about the circled entry. What is the entry in the second row third column of the resulting matrix?

- a. 1      b. 0      c.  $-1$       d. 4      e. 2

12. Use Gaussian elimination to find all solutions of the following matrix.

$$\begin{array}{cc} x & y \\ \left[ \begin{array}{cc|c} 1 & 2 & -1 \\ 0 & 1 & 3 \end{array} \right] . \end{array}$$

- a.  $x = 3$   
 $y = -7$       b.  $x = -1$   
 $y = 3$       c.  $x = -7$   
 $y = 3$       d.  $x = 2$   
 $y = 1$
- e. The system has no solution.

13. Two sociologists have grant money to study school bussing in a certain city. They wish to conduct a survey using 600 telephone contacts and 400 house contacts. Survey company A has personnel to do 30 telephone and 10 house contacts per hour; survey company B can handle 20 telephone and 20 house contacts per hour. If  $x = \#$  hours A and  $y = \#$  hours B, which set of equations should be used to determine how many hours should be scheduled for each firm to produce exactly the number of contacts needed?

a.  $30x + 20y = 400$   
 $10x + 20y = 600$

b.  $30x + 10y = 600$   
 $20x + 20y = 400$

c.  $30x + 10x = 600$   
 $10y + 20y = 400$

d.  $30x + 20y = 600$   
 $10x + 20y = 400$

e.  $30x + 20y = 400$   
 $20x + 20y = 600$

14. What is the solution set of the following system of linear equations?

$$x + 2y - 5z = -1$$

$$x + 3y - 7z = 0$$

$$x + 5y - 12z = 1$$

a.  $x = -1, y = 0, z = 1$

b.  $x = -2, y = 3, z = 1$

c.  $x = -3, y = 1, z = -1$

d. There are infinitely many solutions.

e. There is no solution.

15. The augmented matrix of a system of equations is given by:

$$\begin{array}{ccc|c} & x & y & z \\ \left[ \begin{array}{ccc|c} 1 & 3 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{array} \right] \end{array}$$

What is the general solution to the system?

- a.  $x = -3$   
 $y = \text{any value}$   
 $z = 0$
- b.  $x = -3y$   
 $y = 0$   
 $z = \text{any value}$
- c.  $x = -3y$   
 $y = \text{any value}$   
 $z = 0$
- d.  $x = -6$   
 $y = 2$   
 $z = 0$
- e.  $x = 3$   
 $y = 1$   
 $z = 0$

16. Let  $A = \begin{bmatrix} -1 & 1 \\ 2 & 3 \\ 1 & 0 \end{bmatrix}$  and  $B = \begin{bmatrix} -1 & 0 & 3 \\ 1 & 2 & 2 \end{bmatrix}$ . What is  $AB$ ?

- a.  $\begin{bmatrix} 2 & 2 & -1 \\ 1 & 6 & 12 \\ -1 & 0 & 3 \end{bmatrix}$
- b.  $\begin{bmatrix} 4 & -1 \\ 5 & 7 \end{bmatrix}$
- c.  $\begin{bmatrix} 2 & 2 & 1 \\ 5 & 6 & 3 \\ 1 & 0 & 3 \end{bmatrix}$
- d.  $\begin{bmatrix} -1 & 5 \\ 4 & 7 \end{bmatrix}$
- e. Not defined.

17. Let  $A = \begin{bmatrix} 6 & 2 \\ 5 & 2 \end{bmatrix}$ . What is the entry in the first row and second column of the matrix  $A^{-1}$ ?

- a.  $\frac{5}{2}$                       b. 1                      c. 3                      d. 2                      e. -1

18. If  $A = \begin{bmatrix} 1 & -1 & 1 \\ 0 & 2 & -1 \\ 2 & 3 & 0 \end{bmatrix}$  and  $A^{-1} = \begin{bmatrix} 3 & 3 & -1 \\ -2 & -2 & 1 \\ -4 & -5 & 2 \end{bmatrix}$  the solution of the system of equations

$$\begin{aligned}x - y + z &= 3 \\2y - z &= 1 \\2x + 3y &= 4\end{aligned}$$

- a.  $x = 6, y = -2, z = -9$                       b.  $x = 8, y = -4, z = -9$   
c.  $x = 3, y = 1, z = 4$                       d. There is no solution.  
e.  $x = 16, y = -12, z = -25$

19. Which of the following is both a stochastic matrix and is regular?

- a.  $\begin{bmatrix} .9 & .4 \\ .1 & .5 \end{bmatrix}$                       b.  $\begin{bmatrix} .1 & .2 \\ .3 & .5 \\ .6 & .3 \end{bmatrix}$                       c.  $\begin{bmatrix} .7 & .4 \\ .3 & .6 \end{bmatrix}$                       d.  $\begin{bmatrix} .8 & -.1 \\ .2 & 1.1 \end{bmatrix}$   
e.  $\begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$

20. From past records it is found that from May through September, when it rains one day, then the probability of rain for the next day is .4; when it does not rain one day, then the probability of rain the next day is .06. The matrix of the Markov process is given by:

a.

|         | current |         |
|---------|---------|---------|
|         | rain    | no rain |
| rain    | .4      | .06     |
| no rain | .6      | .94     |

b.

|         | current |         |
|---------|---------|---------|
|         | rain    | no rain |
| rain    | .4      | .94     |
| no rain | .6      | .06     |

c.

|         | current |         |
|---------|---------|---------|
|         | rain    | no rain |
| rain    | .6      | .06     |
| no rain | .4      | .94     |

d.

|         | current |         |
|---------|---------|---------|
|         | rain    | no rain |
| rain    | .6      | .94     |
| no rain | .4      | .06     |

e.

|         | current |         |
|---------|---------|---------|
|         | rain    | no rain |
| rain    | .06     | .4      |
| no rain | .94     | .6      |



