

1. The probability distribution of a random variable X is as follows:

$X = k$	$\Pr(X = k)$
10	0.3
20	0.4
30	0.3

What is the variance of X ?

- a. 460 b. 20 c. 60 d. 6 e. 0
3. Each time a basketball player attempts a free throw, she has an 80% chance of making it. Let X be the number of free throws she makes in 100 attempts. Find the standard deviation of X .
- a. 16 b. 0.16 c. 80 d. 20 e. 4
5. Let Z be a random variable with a standard normal distribution. What is $\Pr(-1 < Z < 1.5)$?
- a. 0.6247 b. 0.7683 c. 0.7745 d. 0.7621 e. 0.7925

6. The manufacturer of the light bulb, Sunshine, has found that the life of the bulb is normally distributed with mean $\mu = 1000$ hours and standard deviation $\sigma = 50$ hours. The company decides to give a money back guarantee if a light bulb fails before 950 hours. A bulb is selected at random. What is the probability that the company will have to refund its price?

- a. 0.0228 b. 0.1 c. 0.9772 d. 0.1587 e. 0.0002

7. A random variable X has a normal distribution with mean $\mu = 20$. If $\Pr(X \geq 30) = 0.0668$, find σ , the standard deviation of X .

- a. 10 b. $\frac{20}{3}$ c. $\frac{25}{4}$ d. $\frac{17}{3}$ e. 1

9. One-third 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 five of them oppose the bond issue.

- a. 0.1747 b. 0.1915 c. 0.1498 d. 0.3413 e. 0.3085

11. A line L passes through the point $(1,2)$ and is parallel to the line

$2x + 3y = 1$. What is the x - intercept of the line L?

- a. $(\frac{7}{2}, 0)$ b. $(4, 0)$ c. $(0, \frac{8}{3})$ d. $(2, 0)$

e. L does not intersect the x- axis.

12. A car dealer offers its new employees a weekly salary of \$250 plus a 3% commission on sales. After one year, employees receive \$150 per week and a 5% commission. For what weekly sales level will the two scales produce the same salary?

- a. \$1,500 b. \$3,000 c. \$10,000 d. \$2,000 e. \$5,000

13. If $A = \begin{bmatrix} -1 & 2 \\ 0 & 1 \\ 2 & -1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 3 \\ -1 & 2 \\ 0 & 1 \end{bmatrix}$ then $2A + B$ is given by:

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

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

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

$\begin{bmatrix} -2 & 4 \\ 0 & 2 \\ 1 & -3 \end{bmatrix}$

15. Which of the following statements about the solutions of the system:

$$\begin{cases} x + y + 2z = 9 \\ 2x + 4y - 3z = 1 \\ 3x + 6y - 5z = 0 \end{cases} \text{ is correct?}$$

- a. The value of x is 2 b. The value of x is 1 c. The value of x is -1
- d. There are infinitely many solutions. e. There are no solutions.

16. The matrix obtained by pivoting the matrix

$$\begin{bmatrix} 1 & 2 & 3 & 4 \\ -1 & 0 & -1 & 2 \\ 0 & 1 & -2 & 3 \end{bmatrix} \text{ about the circled entry is:}$$

a. $\begin{bmatrix} 4 & 2 & 0 & -2 \\ 1 & 0 & -1 & 2 \\ 0 & -1/2 & 1 & -3/2 \end{bmatrix}$ b. $\begin{bmatrix} 4 & 2 & 0 & -2 \\ 1 & 0 & 1 & -2 \\ -2 & 1 & 0 & 7 \end{bmatrix}$ c.

$\begin{bmatrix} 2 & 2 & 1 & 10 \\ -1 & 0 & -1 & 2 \\ -2 & 1 & 0 & 7 \end{bmatrix}$

d. $\begin{bmatrix} 1/3 & 2/3 & 1 & 4/3 \\ 1 & 0 & 1 & -2 \\ 0 & -1/2 & 1 & -3/2 \end{bmatrix}$ e. $\begin{bmatrix} -2 & 2 & 0 & 10 \\ 1 & 0 & 1 & -2 \\ 2 & 1 & 0 & -1 \end{bmatrix}$

17. Let $A = \begin{bmatrix} 1 & 0 & 1 \\ 2 & 1 & 0 \\ 0 & 1 & -1 \end{bmatrix}$. What is the entry in the first row and second column of the matrix A^{-1} ?

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

18. Solve $A \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -1 \\ 2 \end{pmatrix}$ for x , given that $A^{-1} = \begin{pmatrix} -1 & 2 \\ 0 & 2 \end{pmatrix}$.

- a. $x = \frac{3}{2}$ b. $x = 4$ c. $x = 5$ d. $x = 1$ e. $x = -1$

19. Let $A = \begin{bmatrix} 2 & 4 \\ 1 & 3 \end{bmatrix}$. What is the entry in the second row and first column of A^{-1} ?

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

20. A system of linear equations in the variables x , y , z and w has the

augmented matrix: $\begin{matrix} & x & y & z & w \\ \begin{bmatrix} 1 & 0 & 3 & 0 & -1 \\ 0 & 1 & 2 & 0 & 2 \\ 0 & 0 & 0 & 1 & 1 \end{bmatrix} \end{matrix}$. The general solution of the system is

a. $x = -1 - 3z - w$
 $y = 2 - 2z$
 $z = \text{any number}$
 $w = \text{any number}$

b. $x = -1$
 $y = 2$
 $z = 0$
 $w = 1$

c. $x = -5 + 3z$
 $y = 2 - 2z$
 $z = \text{any number}$
 $w = \text{any number}$

d. $x = -w$
 $y = 2$
 $z = 0$
 $w = \text{any number}$

e. $x = -1 - 3z$
 $y = 2 - 2z$
 $z = \text{any number}$
 $w = 1$