

1. 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

2. 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

3. 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

4. A person draws a card at random from a standard deck of 52 cards and guesses its suit. If this is performed 48 times (replacing the card each time), what is the probability that the person will guess the correct suit at least 17 times?

- a. 0.2743 b. 0.0359 c. 0.0495 d. 0.3085 e. 0.0668

5. 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

6. Graph the feasible set for the system of inequalities: $\begin{cases} x + y \leq 2 \\ y - x \geq 1 \end{cases}$
by leaving the feasible set unshaded.
7. 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.
8. 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
9. 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. $\begin{bmatrix} 4 & 5 \\ 1 & 4 \\ 2 & 3 \end{bmatrix}$
10. 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. $\begin{bmatrix} -2 & 4 \\ 0 & 2 \\ 1 & -3 \end{bmatrix}$

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

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

- 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.

12. The matrix obtained by pivoting the matrix

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

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.

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

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

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

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

13. 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. $x = -1$

14. 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

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

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

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|-------------------------|-------------|-------------------------|-------------------------|-------------------------|
| a. $x = -1 - 3z - w$ | b. $x = -1$ | c. $x = -5 + 3z$ | d. $x = -w$ | e. $x =$ |
| $-1 - 3z$ | | | | |
| $y = 2 - 2z$ | $y = 2$ | $y = 2 - 2z$ | $y = 2$ | $y = 2 - 2z$ |
| $z = \text{any number}$ | $z = 0$ | $z = \text{any number}$ | $z = 0$ | $z = \text{any number}$ |
| $w = \text{any number}$ | $w = 1$ | $w = \text{any number}$ | $w = \text{any number}$ | $w = 1$ |

16. Suppose A is a 3×5 matrix, B and C are 4×4 matrices D , is a 4×3 matrix and E is a 4×2 matrix. Which one of the following statements is always correct?

- a. $BC = CB$ b. $B(C+D)$ is defined c. $(B+C)D$ is defined d. DBA is defined
 e. B and D are invertible matrices.

17. For what value of c does the system of equations $\begin{cases} 6x - 3y = -2 \\ -4x + 2y = c \end{cases}$ have a solution?

- a. $c = -\frac{4}{3}$ b. $c = \frac{4}{3}$ c. $c = -\frac{2}{3}$ d. $c = \frac{2}{3}$ e. $c = 0$

18. Suppose that $\begin{bmatrix} -3 & 5 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} p \\ q \end{bmatrix}$. Which of the following statements must be correct?

- a. $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -\frac{1}{13} & -\frac{2}{26} \\ \frac{5}{-13} & \frac{3}{26} \end{bmatrix} \begin{bmatrix} p \\ q \end{bmatrix}$ b. $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \frac{3}{26} & \frac{5}{26} \\ \frac{2}{13} & -\frac{1}{13} \end{bmatrix} \begin{bmatrix} p \\ q \end{bmatrix}$
- c. $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} \frac{1}{13} & -\frac{5}{26} \\ -\frac{2}{13} & -\frac{3}{26} \end{bmatrix} \begin{bmatrix} p \\ q \end{bmatrix}$ d. $\begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -\frac{1}{13} & \frac{5}{26} \\ \frac{2}{13} & \frac{3}{26} \end{bmatrix} \begin{bmatrix} p \\ q \end{bmatrix}$ e. $\begin{bmatrix} x \\ y \end{bmatrix} =$
 $\begin{bmatrix} -\frac{1}{13} & \frac{2}{13} \\ \frac{5}{26} & \frac{3}{26} \end{bmatrix} \begin{bmatrix} p \\ q \end{bmatrix}$

