1. If a system of n linear equations in n unknowns is consistent, then the rank of the matrix of coefficients is n.
   (a) Always true
   (b) Sometimes true
   (c) Never true,
   (d) None of the above

2. If the matrix of coefficients of a system of n linear equations in n unknowns is singular, then the system has infinitely many solutions.
   (a) Always true
   (b) Sometimes true
   (c) Never true,
   (d) None of the above

3. If the reduced row echelon form of the matrix of coefficients of a system of n linear equations in n unknowns is not the identity matrix, then the determinant of the matrix of coefficients is non-zero.
   (a) Always true
   (b) Sometimes true
   (c) Never true
   (d) None of the above

4. If a system of n linear equations in n unknowns is dependent, then the matrix of coefficients has rank less than or equal to $n-1$.
   (a) Always true
   (b) Sometimes true
   (c) Never true
   (d) None of the above

For problems 5 and 6, use the matrices $A = \begin{pmatrix} 2 & -1 & 3 \\ 0 & 4 & -2 \end{pmatrix}$, $B = \begin{pmatrix} -3 & 1 \\ 2 & 5 \end{pmatrix}$, $C = \begin{pmatrix} 3 & -2 \\ 0 & -1 \\ 1 & 2 \end{pmatrix}$.

5. If $D = AC - 4B$, then $d_{12} =$

(a) 4
(b) -3
(c) 1
(d) -1
(e) None of the above.

6. If $D = CBA$, then $d_{32} =$

(a) d_{32} does not exist.
(b) -29
(c) 35
(d) 43
(e) None of the above.

7. Let $A = \begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$. Then $A^{-1} =$:

(a) $\begin{pmatrix} -2 & 3/2 \\ 1 & -1/2 \end{pmatrix}$
(b) $\begin{pmatrix} -1 & 3/2 \\ -2 & 1/2 \end{pmatrix}$
(c) $\begin{pmatrix} -2 & -3/2 \\ 2 & -1/2 \end{pmatrix}$
(d) $\begin{pmatrix} -2 & -3/2 \\ 1 & 1/2 \end{pmatrix}$
(e) None of the above.

8. Let $A = \begin{pmatrix} 1 & -1 & -2 \\ 2 & -3 & -5 \\ -1 & 3 & 5 \end{pmatrix}$. The element in the (1,3) position of A^{-1} is:

(a) A^{-1} does not exist.
(b) 1
(c) -2
(d) 3
(e) None of the above.

9. Let $A = \begin{pmatrix} 1 & 3 & -4 \\ 1 & 5 & -1 \\ 3 & 13 & -6 \end{pmatrix}$. The element in the (1,3) position of A^{-1} is:

(a) 1

(b) -2

(c) 1/2

(d) A^{-1} does not exist.

(e) None of the above.

10. The values of λ such that $A = \begin{pmatrix} 2 & 1 & 6 \\ 0 & 1 & \lambda \\ \lambda & 0 & 4 \end{pmatrix}$ is singular are:

(a) $\lambda = -2,\ 3$

(b) $\lambda = -2,\ -4$

(c) $\lambda = 2,\ 4$

(d) $\lambda = 2,\ 3$

(e) None of the above.

11. The real numbers λ such that $A = \begin{pmatrix} 0 & 1 & \lambda \\ \lambda & 0 & 2 \\ 1 & 1 & -2 \end{pmatrix}$ is nonsingular are:

(a) All real numbers.

(b) $\lambda \neq -1,\ -2$

(c) $\lambda \neq -3,\ 1$

(d) $\lambda \neq 2,\ -2$

(e) None of the above.

12. Given the system of equations $\begin{aligned} x + 3y + z &= -2 \\ 2x + 5y + z &= -5 \\ x + 2y + 3z &= 1 \end{aligned}$. The determinant of the matrix of coefficients is -3. The value of z in the solution set is:

(a) $z = 1/3$

(b) $z = 4/3$

(c) $z = 5/3$

(d) $z = -2$

(e) None of the above.

13. Given the system of equations $\begin{array}{l} 8x - 2y + z = 1 \\ 2x - y + 6z = 3 \\ 6x + y + 4z = 3 \end{array}$. The value of x in the solution set is:

(a) $x = 2$
(b) $x = 1/2$
(c) $x = -1/4$
(d) $x = 1/8$
(e) None of the above.

14. The values of λ for which the system

$$\begin{array}{l} (2-\lambda)x + 8y = 0 \\ 2x + (2-\lambda)y = 0 \end{array}$$

has only the trivial solution are:

(a) All real numbers.
(b) $\lambda \neq 6,\ -2$
(c) $\lambda \neq -8,\ 2$
(d) $\lambda \neq 4,\ -4$
(e) None of the above.

15. The values of λ for which the system

$$\begin{array}{l} (2-\lambda)x - y = 0 \\ x + (4-\lambda)y = 0 \end{array}$$

has nontrivial solutions are:

(a) $\lambda = -3$
(b) $\lambda = -3, 3$
(c) $\lambda = 3$
(d) $\lambda = 2, -2$
(e) None of the above.