المملكة العربية السعودية

وزارة التعليم

MINISTRY OF EDUCATION

هام

لكل المهتمين و المهتمات

بدروس و مراجع الجامعية

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1) The linear equation is

[A] $2x + \ln y = 3$ [B] $3\sin(x_1) - x_2 = 5$

[C] $2x - 3y = -1$ [D] $3xy - z = 5$

2) The linear equation is

[A] $2x + e^y = 3$ [B] $\log_2(x_1) - x_2 = 2$

[C] $2x - 3y = -1$ [D] $3x + \sin\left(\frac{\pi}{2}\right)y - 2z = 1$

3) The non-linear equation is

[A] $2x + y = -3$ [B] $3\sin(x_1) - x_2 = 5$

[C] $2x - 3y = -1$ [D] $3x + y - z = 5$

4) The non-linear equation is

[A] $2x + y = -3$ [B] $2x - 3y = -1$

[C] $2\sqrt{x} - 3y = -1$ [D] $3x + y - z = 5$

5) The non-linear equation is

[A] $\ln(2x) + y = 3$ [B] $2x - 3y = -1$

[C] $x - 3y = -1$ [D] $3x + y - z = 5$

6) Solve the system of linear equations $\begin{matrix} 3x + 2y = 1 \\ 5x + 3y = 0 \end{matrix}$

[A] $x = -3$ and $y = 5$ [B] $x = -3$ and $y = -5$

[C] $x = 3$ and $y = 5$ [D] $x = -3$ and $y = 0$

7) The system $\begin{matrix} 3x+2y=1 \\ 5x+3y=0 \end{matrix}$ is

[A] Consistent with one solution [B] Inconsistent
[C] Consistent with infinite solution

8) The system $\begin{matrix} 3x+2y=1 \\ 6x+4y=0 \end{matrix}$ is

[A] Consistent with one solution [B] Inconsistent
[C] Consistent with infinite solution

9) The system $3x+y=1$ is

[A] Consistent with one solution [B] Inconsistent
[C] Consistent with infinite solution

10) The matrix $\begin{bmatrix} -1 & 2 \\ 3 & 5 \end{bmatrix}$ is a square matrix

[A] True [B] False

11) The matrix $\begin{bmatrix} -2 & 3 & 1 \\ 0 & -1 & 2 \end{bmatrix}$ is of order

[A] 2 [B] 2×3 [C] 3×2 [D] 6

12) The coefficient matrix of the system $\begin{matrix} x-3y=23 \\ 2x+y=-10 \end{matrix}$ is

[A] $A=\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$ [B] $A=\begin{bmatrix} 1 & -3 \\ 2 & 1 \end{bmatrix}$

[C] $A = \begin{bmatrix} 1 & -3 \\ -2 & 1 \end{bmatrix}$ [D] $A = \begin{bmatrix} -1 & -3 \\ 2 & 1 \end{bmatrix}$

13) The matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$ is in a row echelon form

[A] True [B] False

14) The matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is in a row echelon form

[A] True [B] False

15) The matrix $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is in a reduced form

[A] True [B] False

16) The matrix $\left[\begin{array}{cc|c} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{array}\right]$ is in a reduced form

[A] True [B] False

17) The matrix $\left[\begin{array}{cc|c} 1 & 2 & -1 \\ 0 & 1 & 3 \end{array}\right]$ is in a reduced form

[A] True [B] False

18) The operation to transfer the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 2 & 0 & 1 \end{bmatrix}$ to a row echelon form is

$\boxed{A}\ R_3 \to R_3 - R_1$ $\boxed{B}\ R_3 \to R_3 - 2R_1$ $\boxed{C}\ R_3 \to \frac{1}{2}R_3$ $\boxed{D}\ R_3 \to R_3 + 2R_1$

19) The operation to transfer the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 3 & 6 \\ 0 & 0 & 1 \end{bmatrix}$ to a row echelon form is

$\boxed{A}\ R_2 \to R_2 - 3R_1$ $\boxed{B}\ R_2 \to \frac{1}{6}R_2$ $\boxed{C}\ R_2 \to \frac{1}{3}R_2$ $\boxed{D}\ R_2 \to -\frac{1}{3}R_2$

20) The operation to transfer the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ to a row echelon form is

$\boxed{A}\ R_2 \leftrightarrow R_3$ $\boxed{B}\ R_2 \leftrightarrow R_1$ $\boxed{C}\ R_2 \leftrightarrow -R_3$ $\boxed{D}\ R_3 \leftrightarrow R_1$

21) The coefficient matrix of $\begin{aligned} 2x - 5y + 5z &= 17 \\ x - 2y + 3z &= 9 \\ -x + 3y &= -4 \end{aligned}$ is

$\boxed{A}\ \begin{bmatrix} 2 & -5 & 5 \\ 1 & -2 & 3 \\ 1 & 3 & 0 \end{bmatrix}$ $\boxed{B}\ \begin{bmatrix} 1 & -5 & 5 \\ 1 & -2 & 3 \\ -1 & 3 & 0 \end{bmatrix}$

$\boxed{C}\ \begin{bmatrix} 2 & -5 & 5 \\ 1 & 2 & 3 \\ -1 & 3 & 0 \end{bmatrix}$ $\boxed{D}\ \begin{bmatrix} 2 & -5 & 5 \\ 1 & -2 & 3 \\ -1 & 3 & 0 \end{bmatrix}$

22) The augmented matrix of $\begin{aligned} 2x - 5y + 5z &= 17 \\ x - 2y + 3z &= 9 \\ -x + 3y &= -4 \end{aligned}$ is

$\boxed{A}\ \left[\begin{array}{ccc|c} 2 & -5 & 5 & 17 \\ 1 & -2 & 3 & 9 \\ 1 & 3 & 0 & -4 \end{array}\right]$ $\boxed{B}\ \left[\begin{array}{ccc|c} 2 & -5 & 5 & 7 \\ 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \end{array}\right]$

$\boxed{C}\ \left[\begin{array}{ccc|c} 2 & -5 & 5 & 17 \\ 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \end{array}\right]$ $\boxed{D}\ \left[\begin{array}{ccc|c} 2 & -5 & 5 & 17 \\ 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & 4 \end{array}\right]$

23) The system $\begin{aligned} 2x - 5y + 5z &= 17 \\ x - 2y + 3z &= 9 \\ -x + 3y &= -4 \end{aligned}$ has an equivalent augmented matrix

$\boxed{A}\ \left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 1 & 3 & 0 & -4 \\ 2 & -5 & 5 & 17 \end{array}\right]$ $\boxed{B}\ \left[\begin{array}{ccc|c} -1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \\ 2 & -5 & 5 & 17 \end{array}\right]$

$\boxed{C}\ \left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & 4 \\ 2 & -5 & 5 & 17 \end{array}\right]$ $\boxed{D}\ \left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \\ 2 & -5 & 5 & 17 \end{array}\right]$

24) The system $\begin{array}{rcrcrcr} 2x & - & 5y & + & 5z & = & 17 \\ x & - & 2y & + & 3z & = & 9 \\ -x & + & 3y & & & = & -4 \end{array}$ has an equivalent augmented matrix

$\boxed{A}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & 1 & 4 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & 1 & 2 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & 2 & 2 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & -1 & 2 \end{array}\right]$

25) The system $\begin{array}{rcrcrcr} 2x & - & 5y & + & 5z & = & 17 \\ x & - & 2y & + & 3z & = & 9 \\ -x & + & 3y & & & = & -4 \end{array}$ has an equivalent augmented matrix

$\boxed{A}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 2 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 2 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -2 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 2 \end{array}\right]$

26) The solution of the system $\begin{array}{rcrcrcr} 2x & - & 5y & + & 5z & = & 17 \\ x & - & 2y & + & 3z & = & 9 \\ -x & + & 3y & & & = & -4 \end{array}$ is

$\boxed{A}$ $x=1, y=-1, z=-2$ $\boxed{B}$ $x=-1, y=-1, z=2$

$\boxed{C}$ $x=1, y=-1, z=2$ $\boxed{D}$ $x=1, y=1, z=2$

27) The system of $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ has augmented matrix

[A] $\left[\begin{array}{cc|c} 1 & 2 & 1 \\ 2 & 4 & 8 \end{array}\right]$ [B] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 4 & 8 \end{array}\right]$

[C] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 2 & 4 & 0 \end{array}\right]$ [D] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 2 & 4 & 8 \end{array}\right]$

28) The system of $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ has equivalent augmented

[A] $\left[\begin{array}{cc|c} 1 & 2 & 1 \\ 0 & 1 & 2 \end{array}\right]$ [B] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 1 & 4 \end{array}\right]$

[C] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 0 & 0 \end{array}\right]$ [D] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 0 & 2 \end{array}\right]$

29) The system of $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ has

[A] Only one solution [B] no solutions

[C] Infinite solutions [D] two solutions

30) The homogeneous system is

[A] $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ [B] $\begin{matrix} -3x+2y=0 \\ 2x+4y=0 \end{matrix}$

[C] $\begin{matrix} x+2y=1 \\ 2x+4y=0 \end{matrix}$ [D] $\begin{matrix} 3x+2y=1 \\ 2x+4y=-1 \end{matrix}$

31) Every homogeneous system of linear equations is consistent.

[A] True [B] False

32) If a homogeneous system has fewer equations than variables, then it must have finite number of solutions.

[A] True [B] False

33) The system $\begin{aligned} 2x - 5y + 5z &= 0 \\ x - 2y + 3z &= 0 \end{aligned}$ has

[A] two solutions [B] infinite number of solutions

[C] Only trivial solution [D] One solution non trivial

34) The augmented matrix of the system $\begin{aligned} 2x_1 + 4x_2 - 2x_3 &= 0 \\ 3x_1 + 5x_2 &= 0 \end{aligned}$ is

[A] $\left[\begin{array}{ccc|c} 2 & 4 & -2 & 0 \\ 1 & 5 & 0 & 0 \end{array}\right]$ [B] $\left[\begin{array}{ccc|c} 2 & 4 & -2 & 0 \\ 3 & 5 & 0 & 0 \end{array}\right]$

[C] $\left[\begin{array}{ccc|c} 1 & 4 & -1 & 0 \\ 3 & 5 & 0 & 0 \end{array}\right]$ [D] $\left[\begin{array}{ccc|c} 1 & 2 & -2 & 0 \\ 3 & -1 & 0 & 1 \end{array}\right]$

35) The augmented matrix of the system $\begin{aligned} 2x_1 + 4x_2 - 2x_3 &= 0 \\ 3x_1 + 5x_2 &= 0 \end{aligned}$ is

[A] $\left[\begin{array}{ccc|c} 1 & 0 & 5 & 0 \\ 3 & 1 & -3 & 0 \end{array}\right]$ [B] $\left[\begin{array}{ccc|c} 1 & -1 & 5 & 0 \\ 0 & 1 & -3 & 0 \end{array}\right]$

[C] $\left[\begin{array}{ccc|c} 1 & 0 & 5 & 0 \\ 0 & 1 & -3 & 0 \end{array}\right]$ [D] $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & -3 & 0 \end{array}\right]$

36) The coefficient matrix of
$$\begin{aligned} x + y + z &= 4 \\ -x - y + z &= -2 \\ 2x - y + 2z &= 2 \end{aligned}$$
is

$\boxed{A}$ $\begin{bmatrix} 1 & 1 & 4 \\ -1 & -1 & -2 \\ 2 & -1 & 2 \end{bmatrix}$ $\boxed{B}$ $\begin{bmatrix} 1 & 1 & 1 \\ -1 & -1 & 1 \\ 2 & -1 & 2 \end{bmatrix}$

$\boxed{C}$ $\begin{bmatrix} 1 & 1 & 1 \\ 2 & -1 & 1 \\ -1 & -1 & 2 \end{bmatrix}$ $\boxed{D}$ $\begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 1 \\ 2 & -1 & 2 \end{bmatrix}$

37) The augmented matrix of
$$\begin{aligned} x + y + z &= 4 \\ -x - y + z &= -2 \\ 2x - y + 2z &= 2 \end{aligned}$$
is

$\boxed{A}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ -1 & -1 & 1 & -2 \\ 2 & -1 & 2 & 2 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ -1 & -1 & 1 & 2 \\ 1 & -1 & 2 & -2 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 1 & 1 & -1 & -2 \\ 2 & -1 & 2 & 2 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ -1 & -1 & 1 & -2 \\ 2 & 1 & 2 & -2 \end{array}\right]$

38) The system
$$\begin{aligned} x + y + z &= 4 \\ -x - y + z &= -2 \\ 2x - y + 2z &= 2 \end{aligned}$$
has an equivalent augmented matrix by the row operations ($R_2 \to R_2 + R_1$ and $R_3 \to R_3 - 2R_1$)

$\boxed{A}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 0 & 0 & 2 & -2 \\ 0 & -3 & 0 & -6 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 0 & 1 & 2 & 2 \\ 0 & -3 & 0 & -6 \end{array}\right]$

$\boxed{C}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 0 & 2 & 2 \\ 0 & -3 & 0 & -6 \end{bmatrix}$ $\boxed{D}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 0 & 2 & -2 \\ 0 & -3 & 0 & 6 \end{bmatrix}$

39) The system $\begin{aligned} x + y + z &= 4 \\ -x - y + z &= -2 \\ 2x - y + 2z &= 2 \end{aligned}$ has an equivalent augmented matrix by the row operations ($R_2 \leftrightarrow R_3$)

$\boxed{A}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & -3 & 0 & -6 \\ 0 & 0 & 2 & 2 \end{bmatrix}$ $\boxed{B}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 3 & 0 & -6 \\ 0 & 0 & 2 & 2 \end{bmatrix}$

$\boxed{C}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & -3 & 0 & -6 \\ 0 & 0 & 1 & 2 \end{bmatrix}$ $\boxed{D}\ \begin{bmatrix} 1 & -1 & 1 & 4 \\ 0 & -3 & 0 & -6 \\ 0 & 0 & 2 & 2 \end{bmatrix}$

40) The system $\begin{aligned} x + y + z &= 4 \\ -x - y + z &= -2 \\ 2x - y + 2z &= 2 \end{aligned}$ has an equivalent augmented matrix by the row operations ($R_2 \to -\frac{1}{3}R_2$ and $R_3 \to \frac{1}{2}R_3$)

$\boxed{A}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & -1 \end{bmatrix}$ $\boxed{B}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

$\boxed{C}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$ $\boxed{D}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

41) The system $\begin{array}{rrrr} x+ & y+ & z= & 4 \\ -x- & y+ & z= & -2 \\ 2x- & y+ & 2z= & 2 \end{array}$ has an equivalent augmented matrix by the row operations $(R_1 \to R_1 - R_3)$

$\boxed{A}$ $\left[\begin{array}{rrr|r} 1 & -1 & 0 & 3 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{rrr|r} 1 & 1 & 0 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{rrr|r} 1 & 1 & 0 & 4 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 1 & 1 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{rrr|r} 1 & 1 & 0 & 3 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$

42) The system $\begin{array}{rrrr} x+ & y+ & z= & 4 \\ -x- & y+ & z= & -2 \\ 2x- & y+ & 2z= & 2 \end{array}$ has an equivalent augmented matrix by the row operations $(R_1 \to R_1 - R_2)$

$\boxed{A}$ $\left[\begin{array}{rrr|r} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{rrr|r} 1 & 1 & 0 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{rrr|r} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{rrr|r} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$

43) The solution of the system $\begin{array}{rrrr} x+ & y+ & z= & 4 \\ -x- & y+ & z= & -2 \\ 2x- & y+ & 2z= & 2 \end{array}$ is

$\boxed{A}$ $x=1, y=1, z=2$ $\boxed{B}$ $x=1, y=2, z=1$

$\boxed{C}$ $x=1, y=2, z=2$ $\boxed{D}$ $x=1, y=1, z=2$

1) The linear equation is

[A] $2x + \ln y = 3$ [B] $3\sin(x_1) - x_2 = 5$

[C] $2x - 3y = -1$ [D] $3xy - z = 5$

2) The linear equation is

[A] $2x + e^y = 3$ [B] $\log_2(x_1) - x_2 = 2$

[C] $2x - 3y = -1$ [D] $3x + \sin\left(\frac{\pi}{2}\right)y - 2z = 1$

3) The non-linear equation is

[A] $2x + y = -3$ [B] $3\sin(x_1) - x_2 = 5$

[C] $2x - 3y = -1$ [D] $3x + y - z = 5$

4) The non-linear equation is

[A] $2x + y = -3$ [B] $2x - 3y = -1$

[C] $2\sqrt{x} - 3y = -1$ [D] $3x + y - z = 5$

5) The non-linear equation is

[A] $\ln(2x) + y = 3$ [B] $2x - 3y = -1$

[C] $x - 3y = -1$ [D] $3x + y - z = 5$

6) Solve the system of linear equations $\begin{matrix} 3x + 2y = 1 \\ 5x + 3y = 0 \end{matrix}$

[A] $x = -3$ and $y = 5$ [B] $x = -3$ and $y = -5$

[C] $x = 3$ and $y = 5$ [D] $x = -3$ and $y = 0$

7) The system $\begin{matrix} 3x+2y=1 \\ 5x+3y=0 \end{matrix}$ is

[A] Consistent with one solution [B] Inconsistent
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8) The system $\begin{matrix} 3x+2y=1 \\ 6x+4y=0 \end{matrix}$ is

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10) The matrix $\begin{bmatrix} -1 & 2 \\ 3 & 5 \end{bmatrix}$ is a square matrix

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11) The matrix $\begin{bmatrix} -2 & 3 & 1 \\ 0 & -1 & 2 \end{bmatrix}$ is of order

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12) The coefficient matrix of the system $\begin{matrix} x-3y=23 \\ 2x+y=-10 \end{matrix}$ is

[A] $A=\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$ [B] $A=\begin{bmatrix} 1 & -3 \\ 2 & 1 \end{bmatrix}$

[C] $A = \begin{bmatrix} 1 & -3 \\ -2 & 1 \end{bmatrix}$ [D] $A = \begin{bmatrix} -1 & -3 \\ 2 & 1 \end{bmatrix}$

13) The matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$ is in a row echelon form

[A] True [B] False

14) The matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is in a row echelon form

[A] True [B] False

15) The matrix $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is in a reduced form

[A] True [B] False

16) The matrix $\left[\begin{array}{cc|c} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{array}\right]$ is in a reduced form

[A] True [B] False

17) The matrix $\left[\begin{array}{cc|c} 1 & 2 & -1 \\ 0 & 1 & 3 \end{array}\right]$ is in a reduced form

[A] True [B] False

18) The operation to transfer the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 2 & 0 & 1 \end{bmatrix}$ to a row echelon form is

$\boxed{A}\ R_3 \to R_3 - R_1$ $\boxed{B}\ R_3 \to R_3 - 2R_1$ $\boxed{C}\ R_3 \to \frac{1}{2}R_3$ $\boxed{D}\ R_3 \to R_3 + 2R_1$

19) The operation to transfer the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 3 & 6 \\ 0 & 0 & 1 \end{bmatrix}$ to a row echelon form is

$\boxed{A}\ R_2 \to R_2 - 3R_1$ $\boxed{B}\ R_2 \to \frac{1}{6}R_2$ $\boxed{C}\ R_2 \to \frac{1}{3}R_2$ $\boxed{D}\ R_2 \to -\frac{1}{3}R_2$

20) The operation to transfer the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ to a row echelon form is

$\boxed{A}\ R_2 \leftrightarrow R_3$ $\boxed{B}\ R_2 \leftrightarrow R_1$ $\boxed{C}\ R_2 \leftrightarrow -R_3$ $\boxed{D}\ R_3 \leftrightarrow R_1$

21) The coefficient matrix of $\begin{aligned} 2x - 5y + 5z &= 17 \\ x - 2y + 3z &= 9 \\ -x + 3y &= -4 \end{aligned}$ is

$\boxed{A}\ \begin{bmatrix} 2 & -5 & 5 \\ 1 & -2 & 3 \\ 1 & 3 & 0 \end{bmatrix}$ $\boxed{B}\ \begin{bmatrix} 1 & -5 & 5 \\ 1 & -2 & 3 \\ -1 & 3 & 0 \end{bmatrix}$

$\boxed{C}\ \begin{bmatrix} 2 & -5 & 5 \\ 1 & 2 & 3 \\ -1 & 3 & 0 \end{bmatrix}$ $\boxed{D}\ \begin{bmatrix} 2 & -5 & 5 \\ 1 & -2 & 3 \\ -1 & 3 & 0 \end{bmatrix}$

22) The augmented matrix of $\begin{aligned} 2x - 5y + 5z &= 17 \\ x - 2y + 3z &= 9 \\ -x + 3y &= -4 \end{aligned}$ is

$\boxed{A}\ \left[\begin{array}{ccc|c} 2 & -5 & 5 & 17 \\ 1 & -2 & 3 & 9 \\ 1 & 3 & 0 & -4 \end{array}\right]$ $\boxed{B}\ \left[\begin{array}{ccc|c} 2 & -5 & 5 & 7 \\ 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \end{array}\right]$

$\boxed{C}\ \left[\begin{array}{ccc|c} 2 & -5 & 5 & 17 \\ 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \end{array}\right]$ $\boxed{D}\ \left[\begin{array}{ccc|c} 2 & -5 & 5 & 17 \\ 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & 4 \end{array}\right]$

23) The system $\begin{aligned} 2x - 5y + 5z &= 17 \\ x - 2y + 3z &= 9 \\ -x + 3y &= -4 \end{aligned}$ has an equivalent augmented matrix

$\boxed{A}\ \left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 1 & 3 & 0 & -4 \\ 2 & -5 & 5 & 17 \end{array}\right]$ $\boxed{B}\ \left[\begin{array}{ccc|c} -1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \\ 2 & -5 & 5 & 17 \end{array}\right]$

$\boxed{C}\ \left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & 4 \\ 2 & -5 & 5 & 17 \end{array}\right]$ $\boxed{D}\ \left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \\ 2 & -5 & 5 & 17 \end{array}\right]$

24) The system $\begin{array}{rcrcrcr} 2x & - & 5y & + & 5z & = & 17 \\ x & - & 2y & + & 3z & = & 9 \\ -x & + & 3y & & & = & -4 \end{array}$ has an equivalent augmented matrix

$\boxed{A}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & 1 & 4 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & 1 & 2 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & 2 & 2 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & -1 & 2 \end{array}\right]$

25) The system $\begin{array}{rcrcrcr} 2x & - & 5y & + & 5z & = & 17 \\ x & - & 2y & + & 3z & = & 9 \\ -x & + & 3y & & & = & -4 \end{array}$ has an equivalent augmented matrix

$\boxed{A}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 2 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 2 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -2 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 2 \end{array}\right]$

26) The solution of the system $\begin{array}{rcrcrcr} 2x & - & 5y & + & 5z & = & 17 \\ x & - & 2y & + & 3z & = & 9 \\ -x & + & 3y & & & = & -4 \end{array}$ is

$\boxed{A}$ $x=1, y=-1, z=-2$ $\boxed{B}$ $x=-1, y=-1, z=2$

$\boxed{C}$ $x=1, y=-1, z=2$ $\boxed{D}$ $x=1, y=1, z=2$

27) The system of $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ has augmented matrix

[A] $\left[\begin{array}{cc|c} 1 & 2 & 1 \\ 2 & 4 & 8 \end{array}\right]$ [B] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 4 & 8 \end{array}\right]$

[C] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 2 & 4 & 0 \end{array}\right]$ [D] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 2 & 4 & 8 \end{array}\right]$

28) The system of $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ has equivalent augmented

[A] $\left[\begin{array}{cc|c} 1 & 2 & 1 \\ 0 & 1 & 2 \end{array}\right]$ [B] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 1 & 4 \end{array}\right]$

[C] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 0 & 0 \end{array}\right]$ [D] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 0 & 2 \end{array}\right]$

29) The system of $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ has

[A] Only one solution [B] no solutions

[C] Infinite solutions [D] two solutions

30) The homogeneous system is

[A] $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ [B] $\begin{matrix} -3x+2y=0 \\ 2x+4y=0 \end{matrix}$

[C] $\begin{matrix} x+2y=1 \\ 2x+4y=0 \end{matrix}$ [D] $\begin{matrix} 3x+2y=1 \\ 2x+4y=-1 \end{matrix}$

31) Every homogeneous system of linear equations is consistent.

[A] True [B] False

32) If a homogeneous system has fewer equations than variables, then it must have finite number of solutions.

[A] True [B] False

33) The system $\begin{aligned} 2x - 5y + 5z &= 0 \\ x - 2y + 3z &= 0 \end{aligned}$ has

[A] two solutions [B] infinite number of solutions

[C] Only trivial solution [D] One solution non trivial

34) The augmented matrix of the system $\begin{aligned} 2x_1 + 4x_2 - 2x_3 &= 0 \\ 3x_1 + 5x_2 &= 0 \end{aligned}$ is

[A] $\left[\begin{array}{ccc|c} 2 & 4 & -2 & 0 \\ 1 & 5 & 0 & 0 \end{array}\right]$ [B] $\left[\begin{array}{ccc|c} 2 & 4 & -2 & 0 \\ 3 & 5 & 0 & 0 \end{array}\right]$

[C] $\left[\begin{array}{ccc|c} 1 & 4 & -1 & 0 \\ 3 & 5 & 0 & 0 \end{array}\right]$ [D] $\left[\begin{array}{ccc|c} 1 & 2 & -2 & 0 \\ 3 & -1 & 0 & 1 \end{array}\right]$

35) The augmented matrix of the system $\begin{aligned} 2x_1 + 4x_2 - 2x_3 &= 0 \\ 3x_1 + 5x_2 &= 0 \end{aligned}$ is

[A] $\left[\begin{array}{ccc|c} 1 & 0 & 5 & 0 \\ 3 & 1 & -3 & 0 \end{array}\right]$ [B] $\left[\begin{array}{ccc|c} 1 & -1 & 5 & 0 \\ 0 & 1 & -3 & 0 \end{array}\right]$

[C] $\left[\begin{array}{ccc|c} 1 & 0 & 5 & 0 \\ 0 & 1 & -3 & 0 \end{array}\right]$ [D] $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & -3 & 0 \end{array}\right]$

36) The coefficient matrix of
$$\begin{aligned} x + y + z &= 4 \\ -x - y + z &= -2 \\ 2x - y + 2z &= 2 \end{aligned}$$
is

$\boxed{A}$ $\begin{bmatrix} 1 & 1 & 4 \\ -1 & -1 & -2 \\ 2 & -1 & 2 \end{bmatrix}$ $\boxed{B}$ $\begin{bmatrix} 1 & 1 & 1 \\ -1 & -1 & 1 \\ 2 & -1 & 2 \end{bmatrix}$

$\boxed{C}$ $\begin{bmatrix} 1 & 1 & 1 \\ 2 & -1 & 1 \\ -1 & -1 & 2 \end{bmatrix}$ $\boxed{D}$ $\begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 1 \\ 2 & -1 & 2 \end{bmatrix}$

37) The augmented matrix of
$$\begin{aligned} x + y + z &= 4 \\ -x - y + z &= -2 \\ 2x - y + 2z &= 2 \end{aligned}$$
is

$\boxed{A}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ -1 & -1 & 1 & -2 \\ 2 & -1 & 2 & 2 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ -1 & -1 & 1 & 2 \\ 1 & -1 & 2 & -2 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 1 & 1 & -1 & -2 \\ 2 & -1 & 2 & 2 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ -1 & -1 & 1 & -2 \\ 2 & 1 & 2 & -2 \end{array}\right]$

38) The system
$$\begin{aligned} x + y + z &= 4 \\ -x - y + z &= -2 \\ 2x - y + 2z &= 2 \end{aligned}$$
has an equivalent augmented matrix by the row operations ($R_2 \to R_2 + R_1$ and $R_3 \to R_3 - 2R_1$)

$\boxed{A}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 0 & 0 & 2 & -2 \\ 0 & -3 & 0 & -6 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{ccc|c} 1 & 1 & 1 & 4 \\ 0 & 1 & 2 & 2 \\ 0 & -3 & 0 & -6 \end{array}\right]$

$\boxed{C}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 0 & 2 & 2 \\ 0 & -3 & 0 & -6 \end{bmatrix}$ $\boxed{D}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 0 & 2 & -2 \\ 0 & -3 & 0 & 6 \end{bmatrix}$

39) The system $\begin{aligned} x + y + z &= 4 \\ -x - y + z &= -2 \\ 2x - y + 2z &= 2 \end{aligned}$ has an equivalent augmented matrix by the row operations ($R_2 \leftrightarrow R_3$)

$\boxed{A}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & -3 & 0 & -6 \\ 0 & 0 & 2 & 2 \end{bmatrix}$ $\boxed{B}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 3 & 0 & -6 \\ 0 & 0 & 2 & 2 \end{bmatrix}$

$\boxed{C}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & -3 & 0 & -6 \\ 0 & 0 & 1 & 2 \end{bmatrix}$ $\boxed{D}\ \begin{bmatrix} 1 & -1 & 1 & 4 \\ 0 & -3 & 0 & -6 \\ 0 & 0 & 2 & 2 \end{bmatrix}$

40) The system $\begin{aligned} x + y + z &= 4 \\ -x - y + z &= -2 \\ 2x - y + 2z &= 2 \end{aligned}$ has an equivalent augmented matrix by the row operations ($R_2 \to -\frac{1}{3}R_2$ and $R_3 \to \frac{1}{2}R_3$)

$\boxed{A}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & -1 \end{bmatrix}$ $\boxed{B}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

$\boxed{C}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$ $\boxed{D}\ \begin{bmatrix} 1 & 1 & 1 & 4 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 1 & 1 \end{bmatrix}$

41) The system $\begin{array}{rrrr} x+ & y+ & z= & 4 \\ -x- & y+ & z= & -2 \\ 2x- & y+ & 2z= & 2 \end{array}$ has an equivalent augmented matrix by the row operations $(R_1 \to R_1 - R_3)$

$\boxed{A}$ $\left[\begin{array}{rrr|r} 1 & -1 & 0 & 3 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{rrr|r} 1 & 1 & 0 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{rrr|r} 1 & 1 & 0 & 4 \\ 0 & 1 & 0 & -2 \\ 0 & 0 & 1 & 1 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{rrr|r} 1 & 1 & 0 & 3 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$

42) The system $\begin{array}{rrrr} x+ & y+ & z= & 4 \\ -x- & y+ & z= & -2 \\ 2x- & y+ & 2z= & 2 \end{array}$ has an equivalent augmented matrix by the row operations $(R_1 \to R_1 - R_2)$

$\boxed{A}$ $\left[\begin{array}{rrr|r} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{rrr|r} 1 & 1 & 0 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{rrr|r} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{rrr|r} 1 & 0 & 0 & 4 \\ 0 & 1 & 0 & 2 \\ 0 & 0 & 1 & 1 \end{array}\right]$

43) The solution of the system $\begin{array}{rrrr} x+ & y+ & z= & 4 \\ -x- & y+ & z= & -2 \\ 2x- & y+ & 2z= & 2 \end{array}$ is

$\boxed{A}$ $x=1, y=1, z=2$ $\boxed{B}$ $x=1, y=2, z=1$

$\boxed{C}$ $x=1, y=2, z=2$ $\boxed{D}$ $x=1, y=1, z=2$

44) The augmented matrix of

$$\begin{aligned} 4x_1 - 8x_2 - 3x_3 + 2x_4 &= 13 \\ 3x_1 - 4x_2 - x_3 - 3x_3 &= 5 \\ 2x_1 - 4x_2 - 2x_3 + 2x_3 &= 6 \end{aligned}$$

is

$\boxed{A}$ $\left[\begin{array}{cccc|c} 4 & -8 & -3 & 2 & 13 \\ 3 & -4 & -1 & -3 & 5 \\ 2 & -4 & -2 & 2 & 6 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{cccc|c} 4 & 8 & -3 & 2 & 13 \\ 3 & -4 & -1 & -3 & 5 \\ 2 & -4 & -2 & 2 & 6 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{cccc|c} 4 & -8 & -3 & 2 & 3 \\ 3 & -4 & -1 & -3 & 5 \\ 2 & -4 & -2 & 2 & 6 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{cccc|c} 2 & -8 & -3 & 2 & 13 \\ -3 & -4 & -1 & -3 & 5 \\ 4 & -4 & -2 & 2 & 6 \end{array}\right]$

45) The system $\begin{aligned} 4x_1 - 8x_2 - 3x_3 + 2x_4 &= 13 \\ 3x_1 - 4x_2 - x_3 - 3x_3 &= 5 \\ 2x_1 - 4x_2 - 2x_3 + 2x_3 &= 6 \end{aligned}$ has an equivalent augmented matrix by the row operations ($R_3 \to \frac{1}{2}R_3$)

$\boxed{A}$ $\left[\begin{array}{cccc|c} 4 & -8 & -3 & 2 & 13 \\ 3 & -4 & -1 & -3 & 5 \\ 1 & -2 & -2 & 1 & 3 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{cccc|c} 4 & -8 & -3 & 2 & 13 \\ 3 & -2 & -1 & -3 & 5 \\ 1 & -2 & -1 & 1 & 3 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{cccc|c} 4 & -8 & -3 & 2 & 13 \\ 3 & -4 & -1 & -3 & 5 \\ 1 & -2 & -1 & 1 & 3 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{cccc|c} 4 & -8 & -3 & 2 & 13 \\ 3 & -4 & -1 & -3 & 5 \\ 1 & -2 & -1 & -1 & 6 \end{array}\right]$

46) The system $\begin{aligned} 4x_1 - 8x_2 - 3x_3 + 2x_4 &= 13 \\ 3x_1 - 4x_2 - x_3 - 3x_3 &= 5 \\ 2x_1 - 4x_2 - 2x_3 + 2x_3 &= 6 \end{aligned}$ has an equivalent augmented matrix by the row operations ($R_1 \leftrightarrow R_3$)

$\boxed{A}$ $\left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 3 & -4 & -1 & -3 & 5 \\ 4 & -8 & -3 & 2 & 3 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{cccc|c} 4 & -2 & -1 & 1 & 3 \\ 3 & -4 & -1 & -3 & 5 \\ 1 & -8 & -3 & 2 & 13 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 3 & -4 & 1 & -3 & 5 \\ 4 & -8 & -3 & 2 & 13 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 3 & -4 & -1 & -3 & 5 \\ 4 & -8 & -3 & 2 & 13 \end{array}\right]$

47) The system $\begin{aligned} 4x_1 - 8x_2 - 3x_3 + 2x_4 &= 13 \\ 3x_1 - 4x_2 - x_3 - 3x_3 &= 5 \\ 2x_1 - 4x_2 - 2x_3 + 2x_3 &= 6 \end{aligned}$ has an equivalent augmented matrix by the row operations

$\boxed{A}$ $\left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 0 & 2 & 2 & -6 & -4 \\ 0 & 0 & 1 & -2 & 1 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 0 & 2 & 2 & -6 & -4 \\ 0 & 0 & 2 & -2 & 1 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 0 & 2 & 2 & -6 & -4 \\ 0 & 0 & 1 & -2 & 13 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 0 & 1 & 1 & -6 & -4 \\ 0 & 0 & 1 & -2 & 1 \end{array}\right]$

48) The system $\begin{aligned} 4x_1 - 8x_2 - 3x_3 + 2x_4 &= 13 \\ 3x_1 - 4x_2 - x_3 - 3x_3 &= 5 \\ 2x_1 - 4x_2 - 2x_3 + 2x_3 &= 6 \end{aligned}$

has an equivalent augmented matrix by the row operations

$\boxed{A}\ \left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 0 & 1 & 1 & -3 & -4 \\ 0 & 0 & 1 & -2 & 1 \end{array}\right]$ $\boxed{B}\ \left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 0 & 1 & 1 & -3 & -2 \\ 0 & 0 & 1 & -2 & 1 \end{array}\right]$

$\boxed{C}\ \left[\begin{array}{cccc|c} 1 & -2 & -1 & 0 & 3 \\ 0 & 1 & 1 & -3 & -2 \\ 0 & 0 & 1 & -2 & 1 \end{array}\right]$ $\boxed{D}\ \left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 0 & 1 & 1 & -3 & -4 \\ 0 & 0 & 1 & -2 & 1 \end{array}\right]$

49) The system $\begin{array}{rrrrr} 4x_1 - & 8x_2 - & 3x_3 + & 2x_4 = & 13 \\ 3x_1 - & 4x_2 - & x_3 - & 3x_3 = & 5 \\ 2x_1 - & 4x_2 - & 2x_3 + & 2x_3 = & 6 \end{array}$ has an equivalent augmented matrix by the row operations

$\boxed{A}\ \left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 0 & 1 & 1 & -3 & -4 \\ 0 & 0 & 1 & -2 & 1 \end{array}\right]$ $\boxed{B}\ \left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 0 & 1 & 1 & -3 & -2 \\ 0 & 0 & 1 & -2 & 1 \end{array}\right]$

$\boxed{C}\ \left[\begin{array}{cccc|c} 1 & -2 & -1 & 0 & 3 \\ 0 & 1 & 1 & -3 & -2 \\ 0 & 0 & 1 & -2 & 1 \end{array}\right]$ $\boxed{D}\ \left[\begin{array}{cccc|c} 1 & -2 & -1 & 1 & 3 \\ 0 & 1 & 1 & -3 & -4 \\ 0 & 0 & 1 & -2 & 1 \end{array}\right]$

50) The solution of the system

$\begin{array}{rrrrr} 4x_1 - & 8x_2 - & 3x_3 + & 2x_4 = & 13 \\ 3x_1 - & 4x_2 - & x_3 - & 3x_3 = & 5 \\ 2x_1 - & 4x_2 - & 2x_3 + & 2x_3 = & 6 \end{array}$

is

$\boxed{A}\ x_1 = 3t - 2, x_2 = t + 1, x_3 = 2t - 3 \text{ and } x_4 = t; t \in \mathbb{R}$

$\boxed{B}\ x_1 = 3t - 2, x_2 = t - 3, x_3 = 2t + 1 \text{ and } x_4 = t; t \in \mathbb{R}$

$\boxed{C}\ x_1 = 2 - 3t, x_2 = t - 3, x_3 = 2t + 1 \text{ and } x_4 = t; t \in \mathbb{R}$

$\boxed{D}\ x_1 = t - 2, x_2 = t - 3, x_3 = 2t + 1 \text{ and } x_4 = t; t \in \mathbb{R}$

1) The linear equation is

A $2x + \ln y = 3$

B $3\sin(x_1) - x_2 = 5$

C $2x - 3y = -1$

D $3xy - z = 5$

2) The linear equation is

A $2x + e^y = 3$

B $\log_2(x_1) - x_2 = 2$

C $2x - 3y = -1$

D $3x + \sin\left(\frac{\pi}{2}\right)y - 2z = 1$

3) The non-linear equation is

A $2x + y = -3$

B $3\sin(x_1) - x_2 = 5$

C $2x - 3y = -1$

D $3x + y - z = 5$

4) The non-linear equation is

A $2x + y = -3$

B $2x - 3y = -1$

C $2\sqrt{x} - 3y = -1$

D $3x + y - z = 5$

5) The non-linear equation is

A $\ln(2x) + y = 3$

B $2x - 3y = -1$

C $x - 3y = -1$

D $3x + y - z = 5$

6) Solve the system of linear equations $\begin{matrix} 3x + 2y = 1 \\ 5x + 3y = 0 \end{matrix}$

A $x = -3$ and $y = 5$

B $x = -3$ and $y = -5$

C $x = 3$ and $y = 5$

D $x = -3$ and $y = 0$

7) The system $\begin{matrix} 3x+2y=1 \\ 5x+3y=0 \end{matrix}$ is

[A] Consistent with on solution [B] Inconsistent
[C] Consistent with infinite solution

8) The system $\begin{matrix} 3x+2y=1 \\ 6x+4y=0 \end{matrix}$ is

[A] Consistent with on solution [B] Inconsistent
[C] Consistent with infinite solution

9) The system $3x+y=1$ is

[A] Consistent with on solution [B] Inconsistent
[C] Consistent with infinite solution

10) The matrix $\begin{bmatrix} -1 & 2 \\ 3 & 5 \end{bmatrix}$ is a square matrix

[A] True [B] False

11) The matrix $\begin{bmatrix} -2 & 3 & 1 \\ 0 & -1 & 2 \end{bmatrix}$ is of order

[A] 2 [B] 2×3 [C] 3×2 [D] 6

12) The coefficient matrix of the system $\begin{matrix} x-3y=23 \\ 2x+y=-10 \end{matrix}$ is

[A] $A=\begin{bmatrix} 1 & 3 \\ 2 & -1 \end{bmatrix}$ [B] $A=\begin{bmatrix} 1 & -3 \\ 2 & 1 \end{bmatrix}$

[C] $A = \begin{bmatrix} 1 & -3 \\ -2 & 1 \end{bmatrix}$ [D] $A = \begin{bmatrix} -1 & -3 \\ 2 & 1 \end{bmatrix}$

13) The matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$ is in a row echelon form

[A] True [B] False

14) The matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is in a row echelon form

[A] True [B] False

15) The matrix $\begin{bmatrix} 1 & 2 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ is in a reduced form

[A] True [B] False

16) The matrix $\left[\begin{array}{cc|c} 1 & 0 & 2 \\ 0 & 1 & 2 \\ 0 & 0 & 0 \end{array}\right]$ is in a reduced form

[A] True [B] False

17) The matrix $\left[\begin{array}{cc|c} 1 & 2 & -1 \\ 0 & 1 & 3 \end{array}\right]$ is in a reduced form

[A] True [B] False

18) The operation to transfer the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 1 & 0 \\ 2 & 0 & 1 \end{bmatrix}$ to a row echelon form is

$\boxed{A}\ R_3 \to R_3 - R_1$ $\boxed{B}\ R_3 \to R_3 - 2R_1$ $\boxed{C}\ R_3 \to \frac{1}{2}R_3$ $\boxed{D}\ R_3 \to R_3 + 2R_1$

19) The operation to transfer the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 3 & 6 \\ 0 & 0 & 1 \end{bmatrix}$ to a row echelon form is

$\boxed{A}\ R_2 \to R_2 - 3R_1$ $\boxed{B}\ R_2 \to \frac{1}{6}R_2$ $\boxed{C}\ R_2 \to \frac{1}{3}R_2$ $\boxed{D}\ R_2 \to -\frac{1}{3}R_2$

20) The operation to transfer the matrix $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 0 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ to a row echelon form is

$\boxed{A}\ R_2 \leftrightarrow R_3$ $\boxed{B}\ R_2 \leftrightarrow R_1$ $\boxed{C}\ R_2 \leftrightarrow -R_3$ $\boxed{D}\ R_3 \leftrightarrow R_1$

21) The coefficient matrix of $\begin{aligned} 2x - 5y + 5z &= 17 \\ x - 2y + 3z &= 9 \\ -x + 3y &= -4 \end{aligned}$ is

$\boxed{A}\ \begin{bmatrix} 2 & -5 & 5 \\ 1 & -2 & 3 \\ 1 & 3 & 0 \end{bmatrix}$ $\boxed{B}\ \begin{bmatrix} 1 & -5 & 5 \\ 1 & -2 & 3 \\ -1 & 3 & 0 \end{bmatrix}$

C $\begin{bmatrix} 2 & -5 & 5 \\ 1 & 2 & 3 \\ -1 & 3 & 0 \end{bmatrix}$ D $\begin{bmatrix} 2 & -5 & 5 \\ 1 & -2 & 3 \\ -1 & 3 & 0 \end{bmatrix}$

22) The augmented matrix of $\begin{aligned} 2x - 5y + 5z &= 17 \\ x - 2y + 3z &= 9 \\ -x + 3y &= -4 \end{aligned}$ is

A $\left[\begin{array}{ccc|c} 2 & -5 & 5 & 17 \\ 1 & -2 & 3 & 9 \\ 1 & 3 & 0 & -4 \end{array}\right]$ B $\left[\begin{array}{ccc|c} 2 & -5 & 5 & 7 \\ 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \end{array}\right]$

C $\left[\begin{array}{ccc|c} 2 & -5 & 5 & 17 \\ 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \end{array}\right]$ D $\left[\begin{array}{ccc|c} 2 & -5 & 5 & 17 \\ 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & 4 \end{array}\right]$

23) The system $\begin{aligned} 2x - 5y + 5z &= 17 \\ x - 2y + 3z &= 9 \\ -x + 3y &= -4 \end{aligned}$ has an equivalent augmented matrix

A $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 1 & 3 & 0 & -4 \\ 2 & -5 & 5 & 17 \end{array}\right]$ B $\left[\begin{array}{ccc|c} -1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \\ 2 & -5 & 5 & 17 \end{array}\right]$

C $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & 4 \\ 2 & -5 & 5 & 17 \end{array}\right]$ D $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ -1 & 3 & 0 & -4 \\ 2 & -5 & 5 & 17 \end{array}\right]$

24) The system $\begin{array}{rcrcrcr} 2x & - & 5y & + & 5z & = & 17 \\ x & - & 2y & + & 3z & = & 9 \\ -x & + & 3y & & & = & -4 \end{array}$ has an equivalent augmented matrix

$\boxed{A}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & 1 & 4 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & 1 & 2 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & 2 & 2 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{ccc|c} 1 & -2 & 3 & 9 \\ 0 & 1 & 3 & 5 \\ 0 & 0 & -1 & 2 \end{array}\right]$

25) The system $\begin{array}{rcrcrcr} 2x & - & 5y & + & 5z & = & 17 \\ x & - & 2y & + & 3z & = & 9 \\ -x & + & 3y & & & = & -4 \end{array}$ has an equivalent augmented matrix

$\boxed{A}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 2 \end{array}\right]$ $\boxed{B}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 2 \end{array}\right]$

$\boxed{C}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -2 \end{array}\right]$ $\boxed{D}$ $\left[\begin{array}{ccc|c} 1 & 0 & 0 & -1 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & 2 \end{array}\right]$

26) The solution of the system $\begin{array}{rcrcrcr} 2x & - & 5y & + & 5z & = & 17 \\ x & - & 2y & + & 3z & = & 9 \\ -x & + & 3y & & & = & -4 \end{array}$ is

$\boxed{A}$ $x=1, y=-1, z=-2$ $\boxed{B}$ $x=-1, y=-1, z=2$

$\boxed{C}$ $x=1, y=-1, z=2$ $\boxed{D}$ $x=1, y=1, z=2$

27) The system of $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ has augmented matrix

[A] $\left[\begin{array}{cc|c} 1 & 2 & 1 \\ 2 & 4 & 8 \end{array}\right]$ [B] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 4 & 8 \end{array}\right]$

[C] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 2 & 4 & 0 \end{array}\right]$ [D] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 2 & 4 & 8 \end{array}\right]$

28) The system of $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ has equivalent augmented

[A] $\left[\begin{array}{cc|c} 1 & 2 & 1 \\ 0 & 1 & 2 \end{array}\right]$ [B] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 1 & 4 \end{array}\right]$

[C] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 0 & 0 \end{array}\right]$ [D] $\left[\begin{array}{cc|c} 1 & 2 & 4 \\ 0 & 0 & 2 \end{array}\right]$

29) The system of $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ has

[A] Only one solution [B] no solutions

[C] an infinite solutions [D] two solutions

30) The homogeneous system is $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$

[A] $\begin{matrix} x+2y=4 \\ 2x+4y=8 \end{matrix}$ [B] $\begin{matrix} -3x+2y=0 \\ 2x+4y=0 \end{matrix}$

[C] $\begin{matrix} x+2y=1 \\ 2x+4y=0 \end{matrix}$ [D] $\begin{matrix} 3x+2y=1 \\ 2x+4y=-1 \end{matrix}$

31) Every homogeneous system of linear equations is consistent.

[A] True [B] False

32) If a homogeneous system has fewer equations than variables, then it must have finite number of solutions.

[A] True [B] False

33) The system $\begin{aligned} 2x - 5y + 5z &= 0 \\ x - 2y + 3z &= 0 \end{aligned}$ has

[A] two solutions [B] infinite number of solutions

[C] Only trivial solution [D] One solution non trivial

34) The augmented matrix of the system $\begin{aligned} 2x_1 + 4x_2 - 2x_3 &= 0 \\ 3x_1 + 5x_2 &= 0 \end{aligned}$ is

[A] $\left[\begin{array}{ccc|c} 2 & 4 & -2 & 0 \\ 1 & 5 & 0 & 0 \end{array}\right]$ [B] $\left[\begin{array}{ccc|c} 2 & 4 & -2 & 0 \\ 3 & 5 & 0 & 0 \end{array}\right]$

[C] $\left[\begin{array}{ccc|c} 1 & 4 & -1 & 0 \\ 3 & 5 & 0 & 0 \end{array}\right]$ [D] $\left[\begin{array}{ccc|c} 1 & 2 & -2 & 0 \\ 3 & -1 & 0 & 1 \end{array}\right]$

35) The augmented matrix of the system $\begin{aligned} 2x_1 + 4x_2 - 2x_3 &= 0 \\ 3x_1 + 5x_2 &= 0 \end{aligned}$ is

[A] $\left[\begin{array}{ccc|c} 1 & 0 & 5 & 0 \\ 3 & 1 & -3 & 0 \end{array}\right]$ [B] $\left[\begin{array}{ccc|c} 1 & -1 & 5 & 0 \\ 0 & 1 & -3 & 0 \end{array}\right]$

[C] $\left[\begin{array}{ccc|c} 1 & 0 & 5 & 0 \\ 0 & 1 & -3 & 0 \end{array}\right]$ [D] $\left[\begin{array}{ccc|c} 1 & 0 & 0 & 0 \\ 0 & 1 & -3 & 0 \end{array}\right]$