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3. a. $A = \begin{bmatrix} 2 & 3 \\ 1 & 5 \end{bmatrix}$ $\rightarrow \det A = 2 \cdot 5 - 3 \cdot 1 = 10 - 3 = 7$

principal

$R: 7$

b. $A = \begin{bmatrix} 2 & 4 \\ 3 & 6 \end{bmatrix}$ $\rightarrow \det A = 2 \cdot 6 - (4) \cdot 3 = 12 - 12 = 0$

$R: 0$

c. $A = \begin{bmatrix} 3 & -1 & 1 \\ 2 & 1 & -1 \\ 1 & 4 & -2 \end{bmatrix}$ $\rightarrow \det A = 3(-7) = -21$
 $1(-2+4) = -7$
 $-6+1+8 = 3$

$R: 10$

d. $A = \begin{bmatrix} 3 & 2 & -1 \\ 2 & 3 & 2 \\ 1 & 1 & 4 \end{bmatrix}$ $\rightarrow \det A = 36 - 16 = 20$
 $-3+3+16 = 16$
 $36+2-2 = 36$

$R: 20$

$$2. \text{sys} \begin{cases} -3, 0, 1, 2 \\ 0, 2, 0, 1, 2 \end{cases} \quad \begin{matrix} a_{11} = -3 & a_{12} = 0 & a_{13} = 0 \\ a_{21} = 0 & a_{22} = 2 & a_{23} = 0 \\ a_{31} = 0 & a_{32} = 0 & a_{33} = 2 \end{matrix}$$

$$A = \begin{vmatrix} -3 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 2 \end{vmatrix} \begin{matrix} -3 & 0 \\ 0 & 2 \\ 0 & 0 \end{matrix} \rightarrow \det A = -27 - 0 = -27$$

$$-27 \cdot 0 \cdot 0 = -27$$

R:A

$$3. \begin{vmatrix} x & 1 & x \\ 3 & x & 4 \\ 1 & 3 & 3 \end{vmatrix} \begin{matrix} x & 1 \\ 3 & x \\ 1 & 3 \end{matrix} = -3$$

$$3x^2 + 9x + 4 - x^2 - 12x - 9 = -3$$

$$2x^2 - 3x - 5 = -3$$

$$2x^2 - 3x - 2 = 0$$

$$\Delta = b^2 - 4ac$$

$$\Delta = (-3)^2 - 4 \cdot 2 \cdot (-2)$$

$$\Delta = 9 + 16$$

$$\Delta = 25$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{3 \pm 5}{4} \quad x' = \frac{3+5}{4} = \frac{8}{4} = 2$$

$$x'' = \frac{3-5}{4} = \frac{-2}{4} = -\frac{1}{2}$$

$$x = \left\{ -\frac{1}{2}; 2 \right\}$$

R:E

$$4. \quad \begin{array}{c|c} 2 & x-1 \\ \hline 0 & x+1 \\ 2 & -5 \end{array} \quad \begin{array}{c} 0 \\ x-1 \\ 0 \\ 2 \end{array} \quad \begin{array}{c} 0 \\ -1 \\ -1 \\ -1 \end{array}$$

$$(x-1)(x+1)$$

$$x^2 + x - x - 1$$

$$(x^2-1)(x+1)$$

$$x^3 + x^2 - x - 1$$

$$x^3 + x^2 - x - 1 + 2 - x - 1 = 2$$

$$x^3 + x^2 - 2x + 2 - 2 = 0$$

$$x^3 + x^2 - 2x = 0$$

$$x(x^2 + x - 2) = 0$$

$$x = 0 \quad \text{or} \quad x^2 + x - 2 = 0$$

$$x^2 + x - 2 = 0$$

$$\Delta = (1)^2 - 4 \cdot 1 \cdot (-2)$$

$$\Delta = 1 + 8$$

$$\Delta = 9$$

$$x = \frac{-1 \pm \sqrt{9}}{2} = \frac{-1 \pm 3}{2}$$

$$r = x + x' + x'' = 0 + 1 - 2 = -1$$

$$x' = \frac{-1 + 3}{2} = 1 \quad x'' = \frac{-1 - 3}{2} = -2$$

R: C.

$$5. \quad a_{ij} = 2i - 3j$$

$$a_{11} = -1$$

$$a_{12} = -5$$

$$a_{21} = 1$$

$$a_{22} = -2$$

$$a_{31} = 3$$

$$a_{32} = 0$$

$$A = \begin{pmatrix} -1 & -5 \\ 1 & -2 \\ 3 & 0 \end{pmatrix}$$

$$b_{jk} = k - j$$

$$b_{11} = 0$$

$$b_{12} = 1$$

$$b_{13} = 2$$

$$b_{21} = -1$$

$$b_{22} = 0$$

$$b_{23} = 1$$

$$B = \begin{pmatrix} 0 & 1 & 2 \\ -1 & 0 & 1 \end{pmatrix}$$

$$AB = \begin{pmatrix} 5 & -1 & -7 \\ 2 & 1 & 0 \\ 0 & 3 & 6 \end{pmatrix} \quad \begin{pmatrix} 5 & -1 \\ 2 & 1 \\ 0 & 3 \end{pmatrix}$$

$$\det AB = -12 - (-12) = 0$$

$$30 + 0 - 12 = -12$$

R: C

$$6. A = \begin{bmatrix} 2 & 0 & -1 \\ -1 & 1 & 0 \end{bmatrix} \quad B = \begin{bmatrix} 1 & -1 \\ -1 & 1 \\ 0 & 2 \end{bmatrix}$$

$$AB = \begin{bmatrix} 2+0+0 & -2+0-2 \\ -1-1+0 & 1+1+0 \end{bmatrix}$$

$$AB = \begin{bmatrix} 2 & -4 \\ -2 & 2 \end{bmatrix} \rightarrow \det AB = 4 - 8 = -4$$

$$R = \mathbb{D}$$