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

$R: 20$

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

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

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

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.

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

$$\begin{aligned} (x-1)(x+1) \\ x^2-1-x+1 \\ (x^2-1)(x+1) \\ x^3+x^2-x-1 \end{aligned}$$

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

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

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

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

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

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

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

$$\Delta = 1+8$$

$$\Delta = 9$$

$$x = \frac{-b \pm \sqrt{\Delta}}{2a} = \frac{-1 \pm 3}{2}$$

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

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

R: C.

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

$$\begin{aligned} a_{11} &= 2-3 = -1 & a_{12} &= 2-6 = -4 \\ a_{21} &= 4-3 = 1 & a_{22} &= 4-6 = -2 \\ a_{31} &= 6-3 = 3 & a_{32} &= 6-6 = 0 \end{aligned}$$

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

$$b_{ij} = k \cdot j$$

$$\begin{aligned} b_{11} &= 0 & b_{12} &= 1 & b_{13} &= 2 \\ b_{21} &= -1 & b_{22} &= 0 & b_{23} &= -1 \end{aligned}$$

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

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

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

$$30 + 0 - 12 = 18$$

R: C

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

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

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

$$R = \mathbb{D}$$