Q1- $A = \begin{bmatrix} 1 & -2 & 3 \\ 6 & 7 & -1 \\ -3 & 1 & 4 \end{bmatrix}$

$M_{11} = \begin{vmatrix} 7 & -1 \\ 1 & 4 \end{vmatrix} = 29$, $C_{11} = (-1)^{1+1} 29 = 29$ ✓

$M_{12} = \begin{vmatrix} 6 & -1 \\ -3 & 4 \end{vmatrix} = 21$, $C_{12} = (-1)^{1+2}(21) = -21$ ✓

$M_{13} = \begin{vmatrix} 6 & 7 \\ -3 & 1 \end{vmatrix} = 27$, $C_{13} = (-1)^{1+3}(27) = 27$ ✓

⋮

Q15- $A = \begin{bmatrix} \lambda-2 & 1 \\ -5 & \lambda+4 \end{bmatrix}$

$(\lambda-2)(\lambda+4) + 5 = 0$
$\lambda^2 + 4\lambda - 2\lambda - 8 + 5 = 0$
$\lambda^2 + 2\lambda - 3 = 0$
$\lambda^2 + 3\lambda - \lambda - 3 = 0$
$\lambda(\lambda+3) - 1(\lambda+3) = 0$
$(\lambda-1)(\lambda+3) = 0$

$\lambda = 1$, $\lambda = -3$ ✓ ✓

Q16- $A = \begin{bmatrix} \lambda-4 & 0 & 0 \\ 0 & \lambda & 2 \\ 0 & 3 & \lambda-1 \end{bmatrix}$

$|A| = (\lambda-4)\begin{vmatrix} \lambda & 2 \\ 3 & \lambda-1 \end{vmatrix}$

$= (\lambda-4)(\lambda(\lambda-1) - 6)$
$= (\lambda-4)[(\lambda^2-\lambda) - 6]$

$= \lambda^3 - \lambda^2 - 6\lambda - 4\lambda^2 + 4\lambda + 24$
$= \lambda^3 - 5\lambda^2 - 2\lambda + 24$

$\lambda = -2$, $\lambda = 4$, $\lambda = 3$ ✓ ✓ ✓

Q19- (a) $A = \begin{bmatrix} 3 & 0 & 0 \\ 2 & -1 & 5 \\ 1 & 9 & -4 \end{bmatrix}$

$|A| = 3\begin{vmatrix} -1 & 5 \\ 9 & -4 \end{vmatrix}$

$= 3(-41)$
$= -123$ ✓

(b) $|A| = -123 - 2\begin{vmatrix} 0 & 0 \\ 9 & -4 \end{vmatrix} + \begin{vmatrix} 0 & 0 \\ -1 & 5 \end{vmatrix}$

$= -123$ ✓

(d) $|A| = 0 + (-1)\begin{vmatrix} 3 & 0 \\ 1 & -4 \end{vmatrix} - 9\begin{vmatrix} 3 & 0 \\ 2 & 5 \end{vmatrix}$

$= 12 - 135$
$= -123$ ✓

Q33- (b) $\begin{bmatrix} \sin\theta & \cos\theta & 0 \\ -\cos\theta & \sin\theta & 0 \\ \sin\theta - \cos\theta & \sin\theta + \cos\theta & 1 \end{bmatrix}$

$|A| = \begin{vmatrix} \sin\theta & \cos\theta \\ -\cos\theta & \sin\theta \end{vmatrix}$ ✓

$= \sin^2\theta + \cos^2\theta = 1$