

Lelia Hampton

Quiz 6

1) a) $ad - bc$

$$= -30 - (-21) = -30 + 21 = -9 \checkmark$$

The matrix is invertible since $ad - bc \neq 0$. \checkmark

b) The matrix is not invertible since there is a column of zeroes, meaning there are not 3 pivots, so the Invertible Matrix Theorem is not satisfied. \checkmark

$$c) \begin{bmatrix} 1 & -5 & -4 \\ 0 & 3 & 4 \\ -3 & 6 & 0 \end{bmatrix} \xrightarrow{R_1 \leftrightarrow R_3} \begin{bmatrix} -3 & 6 & 0 \\ 0 & 3 & 4 \\ 1 & -5 & -4 \end{bmatrix} \xrightarrow{-\frac{1}{3}R_1 \rightarrow R_1} \begin{bmatrix} 1 & -2 & 0 \\ 0 & 3 & 4 \\ 1 & -5 & -4 \end{bmatrix} \sim$$

$$\begin{bmatrix} 1 & -2 & 0 \\ 0 & 3 & 4 \\ 0 & -3 & -4 \end{bmatrix} \sim \begin{bmatrix} 1 & -2 & 0 \\ 0 & 3 & 4 \\ 0 & 0 & 0 \end{bmatrix} \checkmark$$

NOT invertible; there are not 3 pivot positions \checkmark

d) Invertible because there are 4 pivot positions \checkmark

4pt.

$$2) \det(A) = a_{11} \det(A_{11}) - a_{12} \det(A_{12}) + a_{13} \det(A_{13}) - a_{14} \det(A_{14}) + a_{15} \det(A_{15})$$

$$= 1 \cdot \det(A_{11}) - 0 \cdot \det(A_{12}) + 0 \cdot \det(A_{13}) - 1 \cdot \det(A_{14}) + 0 \cdot \det(A_{15})$$

$$= 1 \cdot \det(A_{11}) - 1 \cdot \det(A_{14})$$

$$= 1 \cdot \det \begin{pmatrix} 0 & -3 & 4 & 0 \\ 4 & 0 & -1 & 3 \\ -3 & 1 & 0 & 1 \\ -5 & 0 & 0 & 0 \end{pmatrix} - 1 \cdot \det \begin{pmatrix} 5 & 0 & -3 & 0 \\ 0 & 4 & 0 & 3 \\ 0 & -3 & 1 & 1 \\ 0 & -5 & 0 & 0 \end{pmatrix}$$

$$-5 \cdot \det(A_{41})$$

$$-5 \cdot \det \begin{pmatrix} -3 & 4 & 0 \\ 0 & -1 & 3 \\ 1 & 0 & 1 \end{pmatrix}$$

$$-5 \cdot \det(A_{42})$$

$$-5 \cdot \det \begin{pmatrix} 5 & -3 & 0 \\ 0 & 0 & 3 \\ 0 & 0 & 0 \end{pmatrix}$$

$$\downarrow \begin{matrix} 2 & 1 \\ 0 \end{matrix}$$

$$-5 \left[-3 \cdot \det(A_{11}) - 4 \det(A_{12}) \right]$$

$$-3 \cdot (-1 - 0) - 4 \cdot (0 - 3)$$

$$-3(-1) - 4(-3)$$

$$3 + 12 = 15$$

$$-5(15)$$

$$-75$$

$$\det(A) = -75$$

Need to continue to compute determinant here

$$\begin{array}{r} 75 \\ \times 5 \\ \hline 75 \end{array}$$