

Name: Richard

Score: 10

Directions: Please answer in the space provided. No calculators. Please put all phones, etc., away.

1. Use any method discussed in class to find  $\begin{vmatrix} 4 & -7 & 9 & 1 \\ 6 & 2 & 7 & 0 \\ 3 & 6 & -3 & 3 \\ 0 & 7 & 4 & -1 \end{vmatrix}$ .

$$\begin{array}{l} \frac{1}{3}R_3 \rightarrow R_3 \\ \longrightarrow \end{array} = 3 \begin{vmatrix} 4 & -7 & 9 & 1 \\ 6 & 2 & 7 & 0 \\ 1 & 2 & -1 & 1 \\ 0 & 7 & 4 & -1 \end{vmatrix}$$

$$\begin{array}{l} R_2 - R \rightarrow R_2 \\ R_3 + R_1 \rightarrow R_3 \end{array} = 3 \begin{vmatrix} 4 & -7 & 9 & 1 \\ 6 & 2 & 7 & 0 \\ -3 & 9 & -10 & 0 \\ 4 & 0 & 13 & 0 \end{vmatrix} \quad (\text{now expand along column 4})$$

$$= -3 \begin{vmatrix} 6 & 2 & 7 \\ -3 & 9 & -10 \\ 4 & 0 & 13 \end{vmatrix} \quad (\text{now expand along row 3})$$

$$= -3 \left( 4 \begin{vmatrix} 2 & 7 \\ 9 & -10 \end{vmatrix} - 0 \begin{vmatrix} 6 & 7 \\ -3 & -10 \end{vmatrix} + 13 \begin{vmatrix} 6 & 2 \\ -3 & 9 \end{vmatrix} \right)$$

$$= -3 \left( 4 \cdot (-83) + 13(54 + 6) \right)$$

$$= -3 \left( 4 \cdot (-83) + 13 \cdot 60 \right)$$

$$= -3 \left( -332 + 780 \right)$$

$$= -3(448)$$

$$= \boxed{-1344}$$

$$\begin{array}{r} \times 3 \\ 448 \\ \hline 1344 \end{array}$$