

1. (5 pts; p283 #18) Using the notion of the rank of a matrix, determine which of the given matrices are nonsingular.

(a) $A = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 2 & 3 \\ 0 & 8 & 0 \end{bmatrix}$. (b) $B = \begin{bmatrix} 1 & 2 & -2 \\ -1 & 2 & 3 \\ 0 & 1 & 1 \end{bmatrix}$.

2. (5 pts) Find this determinant **by using elementary row operations** to put it in row echelon form.

$$\begin{vmatrix} 1 & 0 & -1 & 0 \\ 2 & 2 & 3 & 1 \\ -3 & 0 & 2 & 2 \\ 0 & 2 & 5 & 4 \end{vmatrix}$$

3. (5 pts) For the matrices $A = \begin{bmatrix} 1 & 3 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 1 \\ -1 & 2 \end{bmatrix}$, verify that $\det(AB) = \det(A) \cdot \det(B)$ by calculating AB , $\det(AB)$, $\det(A)$, and $\det(B)$.

4. (5 pts) Find $\begin{vmatrix} x-1 & -2 & 2 \\ 0 & x & 1 \\ 0 & -1 & x+2 \end{vmatrix}$ (leave your answer in factored form).