

Math 260 - Quiz #3a

Name: Solution [Method 2]

Sr #: \_\_\_\_\_

Find the inverse, if it exists, for each of the following matrices:

$$A = \begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 3 \\ 5 & 5 & 1 \end{bmatrix}$$

$$B = \begin{bmatrix} 1 & 2 & -3 \\ 1 & -2 & 1 \\ 5 & -2 & -3 \end{bmatrix}$$

$$|A| = \begin{vmatrix} 1 & 1 & 1 \\ 0 & 2 & 3 \\ 5 & 5 & 1 \end{vmatrix} = 1 \begin{vmatrix} 2 & 3 \\ 5 & 1 \end{vmatrix} + 5 \begin{vmatrix} 1 & 1 \\ 2 & 3 \end{vmatrix} = -8$$

$$A_{11} = \begin{vmatrix} 2 & 3 \\ 5 & 1 \end{vmatrix} = -13$$

$$A_{12} = - \begin{vmatrix} 0 & 3 \\ 5 & 1 \end{vmatrix} = 15$$

$$A_{13} = \begin{vmatrix} 0 & 2 \\ 5 & 5 \end{vmatrix} = -10$$

$$A_{21} = - \begin{vmatrix} 1 & 1 \\ 5 & 1 \end{vmatrix} = 4$$

$$A_{22} = \begin{vmatrix} 1 & 1 \\ 5 & 1 \end{vmatrix} = -4$$

$$A_{23} = - \begin{vmatrix} 1 & 1 \\ 5 & 5 \end{vmatrix} = 0$$

$$A_{31} = \begin{vmatrix} 1 & 1 \\ 2 & 3 \end{vmatrix} = 1$$

$$A_{32} = - \begin{vmatrix} 1 & 1 \\ 0 & 3 \end{vmatrix} = -3$$

$$A_{33} = \begin{vmatrix} 1 & 1 \\ 0 & 2 \end{vmatrix} = 2$$

$$\Rightarrow [A_{ij}] = \begin{bmatrix} -13 & 15 & -10 \\ 4 & -4 & 0 \\ 1 & -3 & 2 \end{bmatrix}$$

$$\text{adj}(A) = [A_{ij}]^T$$

$$= \begin{bmatrix} -13 & 4 & 1 \\ 15 & -4 & -3 \\ -10 & 0 & 2 \end{bmatrix}$$

$$A^{-1} = \frac{\text{adj}(A)}{|A|} = \frac{1}{-8} \begin{bmatrix} -13 & 4 & 1 \\ 15 & -4 & -3 \\ -10 & 0 & 2 \end{bmatrix}$$

$$= \begin{bmatrix} \frac{13}{8} & -\frac{1}{2} & -\frac{1}{8} \\ -\frac{15}{8} & \frac{1}{2} & \frac{3}{8} \\ \frac{5}{4} & 0 & -\frac{1}{4} \end{bmatrix}$$