Math 202 – Quiz # 7f

Name: Method 2 Sec. ________ Sr #: ________

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

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

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

$$\left.\begin{aligned}
A_{11} &= \begin{vmatrix} 2 & 3 \\ 5 & 1 \end{vmatrix} = -13 \\
A_{12} &= -\begin{vmatrix} 0 & 3 \\ 5 & 1 \end{vmatrix} = 15 \\
A_{13} &= \begin{vmatrix} 0 & 2 \\ 5 & 5 \end{vmatrix} = -10 \\
A_{21} &= -\begin{vmatrix} 1 & 1 \\ 5 & 1 \end{vmatrix} = 4 \\
A_{22} &= \begin{vmatrix} 1 & 1 \\ 5 & 1 \end{vmatrix} = -4 \\
A_{23} &= -\begin{vmatrix} 1 & 1 \\ 5 & 5 \end{vmatrix} = 0 \\
A_{31} &= \begin{vmatrix} 1 & 1 \\ 2 & 3 \end{vmatrix} = 1 \\
A_{32} &= -\begin{vmatrix} 1 & 1 \\ 0 & 3 \end{vmatrix} = -3 \\
A_{33} &= \begin{vmatrix} 1 & 1 \\ 0 & 2 \end{vmatrix} = 2
\end{aligned}\right\} \Rightarrow [A_{ij}] = \begin{bmatrix} -13 & 15 & -10 \\ 4 & -4 & 0 \\ 1 & -3 & 2 \end{bmatrix}$$

$$adj(A) = [A_{ij}]^T = \begin{bmatrix} -13 & 4 & 1 \\ 15 & -4 & -3 \\ -10 & 0 & 2 \end{bmatrix}$$

$$A^{-1} = \frac{adj(A)}{|A|} = \frac{1}{-8}\begin{bmatrix} -13 & 4 & 1 \\ 15 & -4 & -3 \\ -10 & 0 & 2 \end{bmatrix} = \begin{bmatrix} \frac{13}{8} & -\frac{1}{2} & -\frac{1}{8} \\ \frac{-15}{8} & \frac{1}{2} & \frac{3}{8} \\ \frac{5}{4} & 0 & -\frac{1}{4} \end{bmatrix}$$