Problem Set 3 Writeup

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1 Multiplication and Inverse Matrices

Problem 3.1 Add AB to AC and compare with $A(B + C)$.

$$A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}, B = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}, C = \begin{bmatrix} 0 & 0 \\ 5 & 6 \end{bmatrix}$$

$$AB = \begin{bmatrix} 1 & 0 \\ 3 & 0 \end{bmatrix}, AC = \begin{bmatrix} 10 & 12 \\ 20 & 24 \end{bmatrix}, AB + AC = \begin{bmatrix} 11 & 12 \\ 23 & 24 \end{bmatrix}$$

$$A(B + C) = \begin{bmatrix} 11 & 12 \\ 23 & 24 \end{bmatrix} = AB + AC$$

This shows an instance in which the commutative property of multiplication holds when working with matrices.

Problem 3.2 Use Gauss Jordan Elimination on $[UI]$ to find the upper triangular U^{-1}.

$$U = \begin{bmatrix} 1 & a & b \\ 0 & 1 & c \\ 0 & 0 & 1 \end{bmatrix}$$

$$U^{-1} = \begin{bmatrix} 1 & a & ac - b \\ 0 & 1 & -c \\ 0 & 0 & 1 \end{bmatrix}$$