Math 128a – Week 13 Worksheet
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Section 6.1 Problems

Problem 1. *Use the Gaussian Elimination Algorithm to solve the following linear systems, if possibly, and determine whether row interchanges are necessary:*

$$\begin{cases} x - y + 3z & = 2 \\ 3x - 3y + z & = 1 \\ x + y & = 3 \end{cases}$$

Problem 2. *Given the linear system*

$$\begin{cases} x - y + \alpha z & = -2 \\ -x + 2y - \alpha z & = 3 \\ \alpha x + y + z & = 2 \end{cases}$$

1. *find the values of α for which the system has no solutions.*
2. *find the values of α for which the system has an infinite number of solutions.*
3. *assuming a unique solution exists for a given α, find the solution.*

Section 6.2 Problems

Problem 3. *Find the row interchanges that are required to solve the following linear system using Algorithm 6.1*

$$\begin{cases} x - 5y + z & = 7 \\ 10x + 20z & = 6 \\ 5x - z & = 4 \end{cases}$$

Section 6.3 Problems

Problem 4. *Is the following matrix nonsingular? If it is compute the inverse:*

$$\begin{pmatrix} 4 & 2 & 6 \\ 3 & 0 & 7 \\ -2 & -1 & -3 \end{pmatrix}$$

Problem 5. *Prove the following:*

1. *if A^{-1} exists, it is unique*
2. *if A is nonsingular, then $(A^{-1})^{-1} = A$*
3. *If A and B are nonsingular matricies of the same size, then $(AB)^{-1} = B^{-1}A^{-1}$*