MATH 307

Group Homework 10

Instructions: Due the beginning of the next class (no late homework is accepted). Read textbook pages 114-117 before working on the homework problems. Show all steps to get full credits.

1. Let $A = \begin{pmatrix} 2 & 3 \\ 1 & 4 \end{pmatrix}, b = \begin{pmatrix} 1 \\ 3 \end{pmatrix}$, solve $Ax = b$ for x using three different methods

   (a) Find a LU decomposition of A and use substitution and back substitution to find x.

   (b) Use Gaussian elimination on the augmented matrix.

   (c) Use Gauss-Jordan elimination to find the inverse of A first and then let $x = A^{-1}x$.

2. Row reduce the following matrix A and then find its rank, nullity, pivot columns and a basis for $range(A)$ and $null(A)$. Note, you could row-reduce it to an upper-triangular matrix or a non-reduced row echelon form or a reduced row echelon form. Row-reducing to an upper triangular matrix involves the least amount of row operations but reducing to a reduced row echelon form makes it easier to find the rank, nullity etc.

$$A = \begin{pmatrix} 1 & 2 & 1 & 3 \\ -3 & 2 & 1 & 0 \\ 3 & 2 & 1 & 1 \end{pmatrix}.$$