

Homework #1
APM 111: Introduction to numerical methods
Assigned, Friday, Feb 10th, 2006.
Due, Tuesday, Feb. 21st, 2006

1. Consider the example worked out in class to demonstrate the effects of not using pivoting, $Ax = b$, with

$$A = \begin{pmatrix} 10 & -7 & 0 \\ -3 & 2.099 & 6 \\ 5 & -1 & 5 \end{pmatrix}.$$

Show that Gaussian elimination on this system leads to the right solution when pivoting is used. assume a precision of 5 digits. repeat with 4 and 3 digits.

2. We considered in class the forward elimination matrices M_n and the permutation matrices P_n .
- very briefly explain what is the general structure of M_n
 - what does the multiplication by a single permutation matrix PM_n do to M_n ? demonstrate using a specific 4×4 example.
 - what does $M_n P^T$ do to M_n ; demonstrate again.
 - what does $PM_n P^T$ do to M_n ; demonstrate.
 - show that finding the inverse M^{-1} involves simply reversing the signs of the terms under the matrix diagonal.
3. Solve question 2.3 in CM (Cleve Moler's "Numerical computing with Matlab") about force balance for a plane truss (Using Matlab's backslash operator to solve the set of linear equations). See the pdf syllabus on the course home page for on line version of the book if you don't have a copy.