MATH 477/577. DUE NOV. 18 **NAME**: _____

HOMEWORK/COMPUTER ASSIGNMENT **ID**: _____

HOMEWORK SET # 5

DATE: _____

Please read lectures 20 ~ 31 in your textbook and review your lecture notes. Graduate students do problems with a star ONLY; undergraduate students do problems without a star ONLY. When submit your work, please use this problem sheet as your cover page.

Question 1.

Fundamental concepts on Gaussian Elimination. For both undergraduates and graduate students.

(a): Problem 20.3.

(b): Problem 21.6.

(c): Problem 23.1.

Question 2.

Fundamental concepts on Gaussian Elimination. For both undergraduates and graduate students. In class, we derived $LU = A$, where $L = (L_1^{-1}L_2^{-1}\cdots L_{m-1}^{-1})$ and L_k is calculated using Gaussian multiplier $l_{jk} = \dfrac{a_{jk}}{a_{kk}}$. Let's define a vector $l_k = [0, 0, \cdots l_{k+1,k} \cdots l_{m,k}]^T$.

(a): show that $L_k = I - l_k e_k^*$ and $(I - l_k e_k^*)(I + l_k e_k^*) = I$. This is why we can write down L_k^{-1} easily.

(b): using the result from part (a), derive a formula for $L_k^{-1}L_{k+1}^{-1}$ and write down matrix $L = L_1^{-1}L_2^{-1}\cdots L_{m-1}^{-1}$ explicitly in terms of Gaussian multiplier.

Question 3.

Fundamental concepts on Eigenvalue Problems

(a): Problem 24.1

(b*): Problem 24.1

(c*): Problem 25.1

Computer Assignment #5 for ALL students:

(1): Do problem 22.2

(2): Do problem 26.2 using the conclusion of 26.1.