Assignment No. 9 **MATHEMATICS 2050** Fall 2004

Due as follows:

Dr. Kondratieva	Tuesday November 16	in class or assignment box #47
Dr. Goodaire	Wednesday November 17	10:00 a.m.
Dr. Yuan	Wednesday November 17	in class

[2] 1. Suppose that A and P are $n \times n$ matrices and A is symmetric. Prove that $P^T AP$ is symmetric.

[3] 2. Find an LDU factorization of the symmetric matrix $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$.

[4] 3. Determine whether or not each of the following matrices has an inverse and find the inverse whenever this exists.

(a) $\begin{bmatrix} 0 & -1 & 2 \\ 2 & 1 & 4 \\ 1 & -1 & 5 \end{bmatrix}$ (b) $\begin{bmatrix} 1 & 1 & 1 \\ 0 & 2 & 3 \\ 5 & 5 & 1 \end{bmatrix}$

[3] 4. Let $A = \begin{bmatrix} 1 & 1 \\ 2 & 4 \end{bmatrix}$ and $C = \begin{bmatrix} 5 & 3 \\ 2 & 2 \end{bmatrix}$.

Given that B is a 2×2 matrix and that $ABC^{-1} = I$, the identity matrix, find B.

[1] 5. (a) Given two $n \times n$ matrices X and Y, how do you determine whether or not $Y = X^{-1}$?

Let A be an $n \times n$ matrix and let I denote the $n \times n$ identity matrix.

[2] (b) If $A^3 = 0$, verify that $(I - A)^{-1} = I + A + A^2$.

[3] (c) Use part (c) to find the inverse of $\begin{bmatrix} 1 & 2 & -1 \\ 0 & 1 & 3 \\ 0 & 0 & 1 \end{bmatrix}$.

[18]

 November 8, 2004