MATH 441.001 NAME (print): _____
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TEST # 1 Review

To be solved in class.

Test will start with: "Solve the following exercises. **Show your work.** (No credit will be given for an answer with no supporting work shown.)"

Ex. 1. Evaluate $\begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} \begin{bmatrix} 4 & 5 & 6 \end{bmatrix} \begin{bmatrix} 1 \\ -1 \\ 1 \end{bmatrix} =$

Note, there are two possible orders to calculate the result: starting multiplication with the first two matrices, or with the last two matrices. One of these orders is easier!

Ex. 2. Let $A^{-1} = \begin{bmatrix} 0 & 1 & 7 \\ -3 & 5 & 4 \\ 2 & 3 & -3 \end{bmatrix}$ and $(B^{-1})^T = \begin{bmatrix} 1 & 1 & -1 \\ 0 & 1 & 1 \\ 0 & 0 & 1 \end{bmatrix}$. Find $[(A^T B)^{-1}]^T$.

Ex. 3. Using block multiplication, evaluate $\begin{bmatrix} 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \end{bmatrix} \begin{bmatrix} 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \\ 0 & 1 & 0 & 1 \\ 1 & 0 & 1 & 0 \end{bmatrix}$

Ex. 4. Represent the equation $\begin{bmatrix} a-b+5 \\ d+c-2a \\ c-d+7 \\ 2b+3 \end{bmatrix} = \begin{bmatrix} 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$ in the form $A \begin{bmatrix} a \\ b \\ c \\ d \end{bmatrix} = \vec{v}$.

Ex. 5. Using Gauss-Jordan elimination, find the inverse of the matrix $A = \begin{bmatrix} 2 & 0 & 4 \\ 2 & 2 & 2 \\ 0 & -2 & 0 \end{bmatrix}$.

Answer: $A^{-1} = \begin{bmatrix} -1/2 & 1 & 1 \\ 0 & 0 & -1/2 \\ 1/2 & -1/2 & -1/2 \end{bmatrix}$

Ex. 6.

(a) Represent matrix $A = \begin{bmatrix} 2 & 1 & 0 \\ 0 & 4 & 2 \\ 6 & 3 & 5 \end{bmatrix}$ as a product $A = LU$.

(b) Use part (a) together with forward and backward substitution to solve the system $A \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix}$.