MATH 210, Discussion 325 — Quiz 6 — March 31, 2008

Name:

Problem 1 (5 points):

Let $X = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, $Y = \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix}$, *and* $Z = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix}$. *Decide which of the following are defined, and evaluate those which are defined:*

a) ZX

b) YZ

c) ZY

Solution:

$ZX = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix} = [1 \cdot 1 + 2 \cdot 2 + 3 \cdot 3] = [1 + 4 + 9] = [14].$

YZ is undefinded.

$ZY = \begin{bmatrix} 1 & 2 & 3 \end{bmatrix} \begin{bmatrix} 1 & 2 \\ 3 & 4 \\ 5 & 6 \end{bmatrix} = \begin{bmatrix} 1 \cdot 1 + 2 \cdot 3 + 3 \cdot 5 & 1 \cdot 2 + 2 \cdot 4 + 3 \cdot 6 \end{bmatrix} = \begin{bmatrix} 22 & 28 \end{bmatrix}.$

Problem 2 (5 points):

Find 2×2 *matrices* A, B *such that* $A \neq \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, $B \neq \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, *and* $AB = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$.

Solution:

For one solution, let $A = \begin{bmatrix} 1 & 0 \\ 0 & 0 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 0 \\ 0 & 1 \end{bmatrix}$.

Problem 3 (5 points):

Let $A = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$. *What is* A^{-1}*?*

Solution:

Using row operations, we find that $A^{-1} = -\frac{1}{2} \begin{bmatrix} 4 & -2 \\ -3 & 1 \end{bmatrix} = \begin{bmatrix} -2 & 1 \\ \frac{3}{2} & -\frac{1}{2} \end{bmatrix}$.