

GEORGIA TECH

SCHOOL OF MATHEMATICS

MATH 1502

CALCULUS II

Quiz # 5

October 3th 2007

First Name : -----

Last Name : -----

Section & TA's name : -----

1. Let $f\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} xy \\ x^2 - y^2 \\ x^2 + y^2 \end{bmatrix}$ and let $g\left(\begin{bmatrix} x \\ y \\ z \end{bmatrix}\right) = \begin{bmatrix} z + y \\ z + 2x \end{bmatrix}$. Compute $g \circ f$:

$$g \circ f\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) =$$

2. Let f, g be the two transformations below. For each of them indicate whether it is linear (YES) or not (NO).

$$f\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} -7x + 11y \\ 5x - 13y \end{bmatrix}, \quad g\left(\begin{bmatrix} x \\ y \end{bmatrix}\right) = \begin{bmatrix} x + y \\ xy \end{bmatrix}.$$

YES NO YES NO

3. Let $A = \begin{bmatrix} 1 & 1 & -1 & 2 \\ -3 & 0 & 4 & -1 \\ 2 & -3 & 5 & 1 \\ 7 & 1 & 0 & 1 \end{bmatrix}$ and let $\mathbf{x} = \begin{bmatrix} 4 \\ 0 \\ 3 \\ 0 \end{bmatrix}$. Compute the second entry of $A\mathbf{x}$ without computing the whole vector $A\mathbf{x}$.

Result =

4. Let f be the linear transformation from \mathbb{R}^2 into \mathbb{R}^2 given first by reflecting about the line $y + x = 0$ and then by reflecting about the line $y = 0$. Compute the matrix A of this transformation :

$$A = \left[\begin{array}{c} \\ \\ \\ \end{array} \right]$$

5. Compute the inverse of the 2×2 matrix $A = \begin{bmatrix} 1 & 1 \\ 1 & 2 \end{bmatrix}$.

$$A^{-1} = \begin{bmatrix} & \\ & \end{bmatrix}$$