

GEORGIA TECH

SCHOOL OF MATHEMATICS

MATH 1502

CALCULUS II, SECTION K

Quiz # 6

October 13th 2010

First Name : -----

Last Name : -----

1. For any three numbers a, b, c , let $A = \begin{bmatrix} a & c \\ 0 & b \end{bmatrix}$

(a) Compute A^2 :

$$A^2 =$$

(b) Find all possible values of a, b, c such that $A^2 = \begin{bmatrix} 1 & -1 \\ 0 & 9 \end{bmatrix}$

(Give the number of possible solutions for the matrix A)

(Use the last page for your calculations)

$$a =$$

$$b =$$

$$c =$$

2. Let \mathbf{u} be the unit vector $\mathbf{u} = \frac{1}{5} \begin{bmatrix} -3 \\ -4 \end{bmatrix}$ and let $\mathbf{x} = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$. Compute \mathbf{x}_{\parallel} and \mathbf{x}_{\perp} where the direction is given by \mathbf{u}
(Use the last page for your calculations)

$$\mathbf{x}_{\parallel} = \begin{bmatrix} \\ \end{bmatrix} \qquad \mathbf{x}_{\perp} = \begin{bmatrix} \\ \end{bmatrix}$$

3. Let $A = \begin{bmatrix} 1 & 3 & -1 & 4 \\ -1 & 3 & -4 & 1 \\ -2 & 1 & 5 & 0 \\ 2 & 7 & 11 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 0 & -9 & 1 \\ -1 & 1 & -2 & 1 \\ 0 & 0 & 5 & 0 \\ 0 & 1 & 17 & 1 \end{bmatrix}$ be two 4×4 matrices. Compute the element $(AB)_{14}$ without computing the whole matrix product AB .

(Use the last page for your calculations)

$$(AB)_{14} =$$

4. A matrix is called *column stochastic* if its entries are nonnegative and if the sum of the entries in each column is one. Let A and B be two column stochastic $n \times n$ matrices. Show that AB is column stochastic.

(Use this page for your calculations)