GEORGIA TECH SCHOOL OF MATHEMATICS

MATH 1502

# CALCULUS II
## Quiz # 6 & 7
*October 17th 2007*

**First Name :** ______________________________________________

**Last Name :** ______________________________________________

**Section & TA's name :** ______________________________________

1. Let $A = \begin{bmatrix} 1 & -1 & -1 & 2 \\ -7 & 0 & 2 & -1 \\ 1 & -3 & 6 & 2 \\ 4 & 2 & 0 & 1 \end{bmatrix}$ and let $B = \begin{bmatrix} 0 & 1 & -1 & 0 \\ -1 & 0 & -3 & 1 \\ 0 & -1 & 2 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix}$.

   Compute the second column of the product $AB$.

$$\text{Result} = \begin{bmatrix} \\ \\ \\ \\ \end{bmatrix}$$

2. Let $A = \begin{bmatrix} 1 & -1 & 3 \\ 2 & 1 & -1 \end{bmatrix}$. Compute its transposed matrix $A^t$ and the product $A \cdot A^t$.

$$A^t = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

$$A \cdot A^t = \begin{bmatrix} \quad & \quad \\ \quad & \quad \end{bmatrix}$$

3. Let $A = \begin{bmatrix} 0 & \ln 3 & 0 \\ 0 & 0 & -\sqrt{5} \\ 0 & 0 & 0 \end{bmatrix}$. Compute $A^2$ and $A^3$.

$$A^2 = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

$$A^3 = \begin{bmatrix} \quad & \quad & \quad \\ \quad & \quad & \quad \\ \quad & \quad & \quad \end{bmatrix}$$

4. Let $\mathbf{x} = \begin{bmatrix} 1 \\ 2 \\ 0 \\ 2 \end{bmatrix}$ and let $\mathbf{y} = \begin{bmatrix} 1 \\ -1 \\ 1 \\ -1 \end{bmatrix}$.

(a) Compute the lengths $|\mathbf{x}|$, $|\mathbf{y}|$ of those vectors.

$|\mathbf{x}| =$

$|\mathbf{y}| =$

(b) Compute the dot product $\mathbf{x} \cdot \mathbf{y}$ and the angle $\theta$ of those vectors

$\mathbf{x} \cdot \mathbf{y} =$

**Angle** $\theta =$

5. Find a one-to-one parametrization of the line $7x + 5y = 3$

$$\begin{bmatrix} x \\ y \end{bmatrix} =$$

6. Find an equation of the plane in $\mathbb{R}^3$ containing the three points $\mathbf{p}_0 = \begin{bmatrix} 1 \\ 1 \\ 1 \end{bmatrix}$, $\mathbf{p}_1 = \begin{bmatrix} 3 \\ 0 \\ 0 \end{bmatrix}$ and $\mathbf{p}_2 = \begin{bmatrix} 2 \\ 0 \\ 1 \end{bmatrix}$,

**equation :**

7. Draw the image by the matrix $A = \begin{bmatrix} 1 & -1 \\ 1 & 1 \end{bmatrix}$ of the unit square, in $\mathbb{R}^2$, based on the vectors $\mathbf{e}_1 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$ and $\mathbf{e}_2 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$.

8. Give the augmented matrix describing the following system of linear equations

$$\begin{aligned} x_1 - 2x_2 + x_3 - 4x_4 &= 1 \\ -x_1 - x_2 - 5x_3 + 2x_4 &= -1 \\ 3x_2 + x_3 - 4x_4 &= 2 \\ x_1 + x_2 + x_3 = x_4 &= 0 \end{aligned}$$

$$[A|b] \; =$$

9. Using row operations, reduce the following matrix to an upper triangular one

$$A = \begin{bmatrix} 1 & -1 & 3 & 0 \\ 2 & 1 & -3 & 1 \\ 0 & 1 & 2 & 1 \end{bmatrix}$$