

# MAT 1302 D – .Test 2 – March 1st ,Winter 2011

**Instructor: Termeh Kousha**

[Print your FAMILY NAME in CAPITAL letters]

Name: \_\_\_\_\_

Student Number: \_\_\_\_\_

Signature: \_\_\_\_\_

**Make sure your cell phone is off before  
starting...**

**Instructions:** This exam consists of 5 questions in 7 pages. The marks for each question are as listed with the question itself. The exam is out of **30**, but there are **33** points possible. (3 bonus points)

No calculators or other electronic aids allowed. No notes, books or other papers allowed.

Write all your answers in **non-erasable pen**. If you make a mistake just scratch it out and continue. You may use the back of pages for answer of questions.

**GOOD LUCK!**

1. Mark each statement True or False. If it's True prove it, if it's false give a counterexample. Note that you can NOT prove that a statement is true by giving examples.

- (a) [3 points] If  $A, B$  are two  $m \times n$  matrices, then both  $AB^T$  and  $A^T B$  are defined.
  
- (b) [3 points] If  $A_{n \times n}$  is an invertible matrix, then the equation  $Ax = \vec{b}$  is always consistent for ANY  $\vec{b} \in \mathbb{R}^n$ .
  
- (c) [3 points] If  $A$  and  $B$  are two  $n \times n$  matrices, then if  $AB = 0$  then either  $A = 0$  or  $B = 0$ .
  
- (d) [3 points] If  $A$  and  $B$  are two  $n \times n$  matrices, such that  $AB$  and  $B$  are both invertible, then  $A$  is also invertible.
  
- (e) [3 points] Every equation that has a solution in  $\mathbb{C}$ , has also a solution in  $\mathbb{R}$ .

2. [4 points] Let  $A = \begin{bmatrix} 0 & -1 & 0 \\ 2 & 2 & -3 \\ -1 & -1 & 1 \end{bmatrix}$ . Find the inverse of  $A$  if it exists.

3. [5 points] Let  $A = \begin{bmatrix} 2 & 1 & -2 \\ 0 & 3 & 2 \\ 1 & 2 & -1 \end{bmatrix}$  and  $B = \begin{bmatrix} 2 & -2 \\ 0 & 0 \\ 2 & 2 \end{bmatrix}$ . Find  $AB$ ,  $\frac{1}{2}(B^T A)$ ,  $A^T B$  and  $A + B$  when it's defined.

4. [3 points] Consider the production model  $x = Cx + d$  for an economy with two sectors, where

$$C = \begin{bmatrix} 0 & .5 \\ .6 & 0.2 \end{bmatrix} \quad d = \begin{bmatrix} 30 \\ 40 \end{bmatrix}.$$

Use an inverse matrix to determine the production level necessary to satisfy the final demand.

5. [6 points] Let  $z = 3 - 2i$ ,  $w = -3 - 4i$  and  $r = -5$ . Calculate the following:  
(Write them in the form of  $a + ib$ )

a.  $z.w$

b.  $\frac{\bar{z}}{w}$

c.  $|rw|$

d.  $\frac{1}{z} + \frac{1}{w}$

Extra Page