

Math 211.01: First Midterm

March 1, 2006

Name:

School ID:

Answer all the following questions, justifying all your statements. Write neatly so that we can read and follow your answers. You are not allowed to use calculators, and please turn off cell phones. Use the back of the exam for scrap. There are five questions. Good luck!

Problem 1. Let $A = \begin{bmatrix} 1 & 1 & 0 \\ 2 & 1 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix}$.

(i) (8 points) Which of the products A^2 , B^2 , AB , BA are defined?

B^2 , BA are defined. The others are not
 eg $\begin{matrix} A & B \\ 2 \times 3 & 2 \times 2 \end{matrix}$
 \swarrow do not match.

(ii) (12 points) Calculate the products that are defined.

$$\begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 \cdot 1 + 3 \cdot 0 & 1 \cdot 3 + 3 \cdot 1 \\ 0 & 1 \end{bmatrix} = \begin{bmatrix} 1 & 6 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 3 \\ 0 & 1 \end{bmatrix} \begin{bmatrix} 1 & 1 & 0 \\ 2 & 1 & 1 \end{bmatrix} = \begin{bmatrix} 7 & 4 & 3 \\ 2 & 1 & 1 \end{bmatrix}$$

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|-------|-------|--|
| 1 | 20pt | |
| 2 | 15pt | |
| 3 | 15pt | |
| 4 | 30pt | |
| 5 | 20pt | |
| Total | 100pt | |