

Mth 306 Test 1x | Winter 2008 | Name:

Bent Petersen 306w2008xa.tex

Time: 50 min. Date: (Date and time by arrangement.) Location: MLC, SSD, etc.

- Do not ignore these instructions!
- This is a make-up test. It is similar, but not identical, to the in-class test. A scantron is not required. Place your answers in the boxes provided below and return this test.
- Depending on your solution methods your answers may appear in a different form from the ones provided on the test. You are expected to be able to provide the appropriate manipulations to identify the correct answer.
- You may use one 8.5 × 11 inch note sheet prepared in advance. Note sheets may not be shared. If you do not bring a note sheet you will have to do without any help notes. You may not use any books, notebooks, additional note sheets nor note cards.
- You may use a simple scientific calculator or a modest graphics calculator on this test and you are expected to have one available. An overly elaborate calculator, laptop, handheld or notebook computer, or any device capable of extensive symbolic manipulation (other than your own brain) will not be allowed. Calculators and other equipment may not be shared.
- During the test be sure to check the board occasionally for corrections. Note $\log(x)$, $\ln(x)$ or $\log_e(x)$ means the natural logarithm of x . I will use $\log_{10}(x)$ to denote the logarithm base 10 of x .
- There are 9 multiple-choice problems worth 12 points each. The total number of points is 108 points.

Problem 1. Simplify

$$\frac{(1 + 2i)(3 - i)}{(1 + i)(1 - 2i)}$$

where $i = \sqrt{-1}$.

- A.) $1 - 2i$ B.) $1 + 2i$
C.) $3 + 2i$ D.) 6 E.) None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 1).

Problem 2. Find the determinant of the matrix

$$A = \begin{bmatrix} 3 & t & 2 \\ t & 3 & t \\ 3 & 0 & 2 \end{bmatrix}.$$

- A.) 1 B.) t
C.) t^2 D.) t^3 E.) None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 2).

Problem 6. Let

$$A = \begin{bmatrix} 2 & 1 & 0 \\ -1 & 1 & 1 \\ 4 & 2 & 2 \end{bmatrix}, \quad B = \begin{bmatrix} -1 & -3 & 1 \\ -1 & 2 & 3 \\ 1 & 2 & 1 \end{bmatrix}, \quad C = AB - BA.$$

If $C = (c_{ij})_{1 \leq i \leq 3, 1 \leq j \leq 3}$ then $c_{33} =$

- A.)** 0 **B.)** 4
C.) 8 **D.)** 12 **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 6).

Problem 7. Let

$$B = \begin{bmatrix} 0 & 1 & 3 \\ 1 & -1 & 1 \\ 3 & 1 & 0 \end{bmatrix}.$$

Solve the equation $(I + B^T B)A = 20B$ for A . Here I is the 3×3 identity matrix and B^T is the transpose of B . If the entries in A are a_{ij} as usual, then $a_{22} =$

- A.)** -1 **B.)** -2
C.) -4 **D.)** -8 **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 7).

Problem 8. Let $T : \mathbb{R}^3 \rightarrow \mathbb{R}^3$ be the linear transformation defined by

$$T \left(\begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} \right) = \begin{bmatrix} x_1 + x_2 + 3x_3 \\ x_1 - x_2 + x_3 \\ 2x_1 - x_2 + x_3 \end{bmatrix}$$

and let A be the matrix of T . Compute the determinant $\det(A)$ of A .

- A.)** 1 **B.)** 2
C.) 4 **D.)** 8 **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 8).

Problem 9. If some n vectors in \mathbb{R}^5 span \mathbb{R}^5 then

- A.)** $n = 5$ **B.)** $n \geq 5$
C.) $n \leq 5$ **D.)** they are linearly independent **E.)** None of the foregoing.

←Mark answer here. A scantron is not required.

(Problem 9).

Use the backs of the test pages for scratch work.