MATH 210 **FRACTICE EXAM 2** **OCT, 2006**

No Scratch paper outside of the Exam book is permitted!

On the answer sheet, fill in the following in the appropriate spaces and darken the corresponding ovals:

1. Last name, first and middle initials.
2. Student Z Number. (LEFT-justify the 6 digits in the ID field leaving the last 3 spaces blank.)
3. Section:

A1=11	A3=13	A5=15	A7=17
A2=12	A4=14	A6=16	A8=18

4. Your signature on the back.

Problems: Check that your exam contains exactly 15 problems. Each problem is worth 6 points. Circle the answer on the exam and darken the corresponding oval on the answer sheet.

[1A] Find the y-intercept of the line $3x + y = 4$:
(a) 1.
(b) 2.
(c) 3.
(d) 4.
(e) None of the above.

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[2A] Find the point of intersection of the lines:

$$2x - 3y = -8 \quad \text{and} \quad 4x - y = 2$$

(a) $\left(\frac{7}{5}, \frac{-18}{5}\right)$.

(b) $\left(\frac{7}{5}, \frac{18}{5}\right)$.

(c) $\left(\frac{1}{5}, \frac{14}{5}\right)$.

(d) $(-4, 0)$.

(e) None of the above.

[3A]Given:

$$\begin{bmatrix} 1 & 0 & -2 & -2 \\ 0 & 1 & 0 & -5 \\ -4 & 0 & 9 & 9 \\ 0 & 2 & 1 & -8 \end{bmatrix}^{-1} = \begin{bmatrix} 9 & 0 & 2 & 0 \\ -20 & -9 & -5 & 5 \\ 8 & 2 & 2 & -1 \\ -4 & -2 & -1 & 1 \end{bmatrix}$$

solve

$$\begin{array}{rcrcrcl} w & & - & 2y & - & 2z & = & 4 \\ & x & & & - & 5z & = & 3 \\ -4w & & + & 9y & + & 9z & = & 2 \\ & 2x & + & y & - & 8z & = & 1 \end{array}$$

In the solution:
(a) $z = -23$
(b) $z = -15$
(c) $z = -17$
(d) $z = -19$
(e) None of the above.

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[4A] Consider the inverse (if it exists) of:

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

(a) The entry in the second row and third column is 0.
(b) The entry in the third row and third column is 1/4.
(c) The entry in the third row and third column is -1/4.
(d) The entry in the third row and third column is 1.
(e) The matrix is not invertible.

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[5A] Let

$$A = \begin{bmatrix} 1 & 2 & 3 & -1 \\ 7 & 0 & -2 & 4 \end{bmatrix} \quad \text{and} \quad B = \begin{bmatrix} 0 & 2 \\ 1 & -1 \\ 3 & 4 \\ -2 & 0 \end{bmatrix}$$

If possible,find the entry in the first row and second column of AB.
(a) -14
(b) 6
(c) 12
(d)13
(e) The product is undefined.

[6A] Which of the following matrices are invertible?

$$A = \begin{bmatrix} 8 & -2 \\ -16 & 4 \end{bmatrix}, \quad B = \begin{bmatrix} 0 & 5 \\ -1 & 0 \end{bmatrix}, \quad C = \begin{bmatrix} 0 & 2 \\ 0 & 4 \end{bmatrix}, \quad D = \begin{bmatrix} 8 & 4 \\ -16 & 8 \end{bmatrix}$$

(a) A only.
(b) A and B only.
(c) A,B,C and D.
(d) B and D only.
(e) Some other selection.

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[7A] Solve the system:

$$\begin{aligned} 2x + y + 2z &= 0 \\ 3y + 6z &= -18 \\ y + 2z &= 4 \end{aligned}$$

In the solution:
(a) $x = 2$.
(b) $x =$any value.
(c) $x = -7$.
(d) No solution.
(e) None of the above.

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[8A] Determine the value of k so that the following system has infinitely many solutions.

$$\begin{cases} 4x + 2y &= 5 \\ 12x + ky &= 15 \end{cases}$$

(a) -10
(b) 6
(c) 0
(d) -6
(e) None of the above.

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[9A] If A is a 5x2 matrix and the matrix product ACC is defined, what is the size of C?
(a) 2x2.
(b) 5x2.
(c) 5x5.
(d) 2x5.
(e) None of the above.

[10A] Suppose that you performed Gauss-Jordan elimination to solve a system of equations with variables x,y and z. You ended up with the augmented matrix:

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 6 \\ 0 & 1 & 0 & -4 \\ 0 & 0 & 0 & 0 \end{array}\right]$$

Which of the following statements is true?
(a) There are no solutions to the system.
(b) The general solution is:

$$\begin{aligned} x &= -6 \\ y &= 4 \\ z &= \text{any value} \end{aligned}$$

(c) A specific (particular) solution is

$$x = 6 \qquad y = -4 \qquad z = 0$$

(d) A specific (particular) solution is

$$x = 6 \qquad y = 4 \qquad z = 5$$

(e) None of the above.

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[11A] Which statements are true?
[I] A non-square matrix never has an inverse.
[II] If A is a matrix then A+A always exists..
[III] If A is a matrix and c a scalar then cA always exists.
[IV] If A and B are matrices then A-B always exists.
(a) I, II and III only.
(b) III and IV only.
(c) III only.
(d) II and III only.
(e) Some other selection.

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[12A] Let

$$A = \begin{bmatrix} 1 & 2 \\ 0 & 1 \end{bmatrix}, \qquad B = \begin{bmatrix} -1 & 4 \\ 0 & -1 \end{bmatrix}$$

Compute the top right entry of $AB - BA$
(a) 4.
(b) 3
(c) 2.
(d) 1.
(e) 0.

[13A] Let

$$A = \begin{bmatrix} 3 & 5 & 1 \\ -2 & -4 & 2 \end{bmatrix}, \quad B = \begin{bmatrix} 0 & -2 & -4 \\ -3 & 1 & -5 \end{bmatrix}$$

Which of the following statements about $(A - 2B)$ are true?
[I] Its size is 2x3.
[II] The entry in the first row, first column is 3.
[III] The entry in the first row, second column is 1.
(a) I only.
(b) I and II only.
(c) III only.
(d) II only.
(e) II and III only.

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[14A] Which of the following systems have no solutions?

$$I. \begin{cases} x + 2y - 4z = 10 \\ y + z = -6 \end{cases} \qquad II. \begin{cases} x + 2y - 4z = 10 \\ y + z = -6 \\ -y - z = -6 \end{cases}$$

$$III. \begin{cases} x + 2y - 4z = 10 \\ y + z = -6 \\ w = 8 \end{cases}$$

(a) I only.
(b) I and II only.
(c) II only.
(d) III only.
(e) Some other selection.

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[15A] Section 2.7 Omitted.