MATH 210 EXAM 2 FORM A October 24, 2014

Name (printed) _____ Section _____

Name (signature) _____ ZID No. _____

INSTRUCTIONS:

(1) Use a No. 2 pencil.
(2) Work on this test. No scratch paper is allowed.
(3) Write your name and ZID number on your answer sheet, filling in the corresponding ovals.
(4) Write your recitation section in the boxes marked "Section," beginning with a zero:
01 = Tues 1–2 02 = Tues 2–3 03 = Thurs 1–2 04 = Thurs 2–3
(5) This test is Form A and should have a RED answer sheet. Fill in A in the oval corresponding to Form type on your answer sheet.
(6) Check that there are 15 questions on your examination form.
(7) Check your scantron carefully for errors and then sign your name on the back.
(8) "NOTA" means "none of the above answers is correct."

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(1) True or False? Consider the following two statements:

I. An acre is smaller than a football field.
II. A 17 inch pizza is larger than two 12 inch pizzas.

(a) both I and II are true
(b) I is true, II is false
(c) I is false, II is true
(d) both I and II are false

(2) Which of the following matrices are in row-reduced form?

I. $\begin{bmatrix} 1 & 2 & 3 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 2 & 3 \\ 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix}$ II. $\begin{bmatrix} 0 & 1 & 2 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$ III. $\begin{bmatrix} 1 & 2 & 3 & 4 \\ 0 & 1 & 5 & 6 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

(a) I only
(b) I and II only
(c) I, II and III
(d) I and III only
(e) NOTA

(3) What are the intercepts of the line $2x + 3y = 6$?

(a) $(3, 0)$ and $(0, 2)$
(b) $(2, 0)$ and $(0, 3)$
(c) $(-3, 0)$ and $(0, -2)$
(d) $(-2, 0)$ and $(0, -3)$
(e) NOTA

(4) True or False? Consider the following two statements:

I. A linear system with 3 equations and 4 variables cannot have a unique solution.
II. A linear system with 4 equations and 3 variables cannot have a unique solution.

(a) both I and II are true
(b) I is true, II is false
(c) I is false, II is true
(d) both I and II are false

(5) If x and y satisfy the equations

$$\begin{cases} 3x + 5y = 15 \\ x - 3y = 9 \end{cases}$$

what is the value of $x + y$?

(a) $\frac{51}{7}$ (b) -3 (c) $-\frac{6}{7}$ (d) 13 (e) $\frac{39}{7}$

(6) If you pivot on the entry $\frac{10}{3}$ in row 2, column 2 of the matrix

$$\begin{bmatrix} 1 & -\frac{1}{3} & \frac{1}{3} & \frac{1}{3} \\ 0 & \frac{10}{3} & -\frac{10}{3} & \frac{8}{3} \\ 0 & \frac{5}{3} & -\frac{5}{3} & \frac{4}{3} \end{bmatrix}$$

what will be the third row of the resulting matrix?

(a) $0 \quad 0 \quad -\frac{10}{3} \quad \frac{4}{3}$
(b) $0 \quad 0 \quad -\frac{10}{3} \quad \frac{8}{3}$
(c) $0 \quad 0 \quad 0 \quad \frac{8}{3}$
(d) $0 \quad 0 \quad 0 \quad 0$
(e) NOTA

(7) What is the inverse of the matrix $\begin{bmatrix} a & b \\ -b & a \end{bmatrix}$?

(a) $\frac{1}{a^2+b^2}\begin{bmatrix} a & -b \\ b & a \end{bmatrix}$

(b) $\frac{1}{a^2+b^2}\begin{bmatrix} a & b \\ -b & a \end{bmatrix}$

(c) $\frac{1}{a^2-b^2}\begin{bmatrix} a & b \\ -b & a \end{bmatrix}$

(d) $\frac{1}{a^2-b^2}\begin{bmatrix} a & -b \\ b & a \end{bmatrix}$

(e) NOTA

(8) If A has dimension $m \times n$ and B has dimension $s \times t$, what must be true about these dimensions if the matrices BA and AB are both defined?

(a) $m = s$, $n = t$

(b) $n = s$

(c) $m = n$, $s = t$

(d) $m = t$, $n = s$

(e) NOTA

(9) A linear system of two equations in the four variables x_1, x_2, x_3, x_4 row reduces to

$$\begin{bmatrix} 1 & -2 & 0 & 3 & 5 \\ 0 & 0 & 1 & -4 & 6 \end{bmatrix}$$

If $x_2 = 5$ and $x_4 = 7$, what are the values of x_1 and x_3 ?

(a) $x_1 = -11$, $x_3 = 28$

(b) $x_1 = 16$, $x_3 = -22$

(c) $x_1 = -6$, $x_3 = 34$

(d) $x_1 = -6$, $x_3 = 26$

(e) NOTA

(10) Let $A = \begin{bmatrix} 1 & 2 \\ 3 & -4 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 3 \\ 1 & 1 \end{bmatrix}$. Find AB

(a) $\begin{bmatrix} 4 & 6 \\ 3 & -4 \end{bmatrix}$ (b) $\begin{bmatrix} 6 & 2 \\ 8 & 5 \end{bmatrix}$ (c) $\begin{bmatrix} 13 & -4 \\ 4 & -2 \end{bmatrix}$

(d) $\begin{bmatrix} 5 & 5 \\ 4 & -3 \end{bmatrix}$ (e) NOTA

(11) Given that the inverse matrix of

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 3 \\ 1 & 0 & 8 \end{bmatrix} \quad \text{is} \quad A^{-1} = \begin{bmatrix} -40 & 16 & 9 \\ 13 & -5 & -3 \\ 5 & -2 & -1 \end{bmatrix}$$

what is the value of z when you solve the system

$$\begin{cases} x + 2y + 3z = 2 \\ 2x + 5y + 3z = 5 \\ x + 8z = -1 \end{cases}$$

(a) 1 (b) -1 (c) 2 (d) -2 (e) NOTA

(12) In the standard method of finding the inverse of a 3×3 matrix A by row reducing the matrix $[A \mid I_3]$, a student got to the partially reduced matrix

$$\begin{bmatrix} 1 & 0 & -1 & 2 & 3 & 10 \\ 0 & 1 & 3 & -6 & 7 & 30 \\ 0 & 0 & 2 & 0 & 10 & 20 \end{bmatrix}.$$

Assuming the work is correct so far, what is the entry in row 1, column 3 of A^{-1}?

(a) 30 (b) 15 (c) 20 (d) -20 (e) NOTA

(13) 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 3×2.

II. The entry in the first row, second column is 1.

III. The entry in the second row, second column is -6.

(a) I only

(b) II only

(c) III only

(d) I and II only

(e) II and III only

(14) Write the system $\begin{cases} y - 2z = 10 \\ 2x - y + 3z = 0 \\ x + 4y - 7 = 0 \end{cases}$ as a single matrix equation.

(a) $\begin{bmatrix} 1 & -2 & 0 \\ 2 & -1 & 3 \\ 1 & 4 & 0 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 10 \\ 0 \\ 7 \end{bmatrix}$

(b) $\begin{bmatrix} 0 & 1 & -2 \\ 2 & -1 & 3 \\ 1 & 4 & 0 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 10 \\ 0 \\ 7 \end{bmatrix}$

(c) $\begin{bmatrix} 0 & 1 & -2 \\ 2 & -1 & 3 \\ 1 & 4 & -7 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 10 \\ 0 \\ 0 \end{bmatrix}$

(d) $\begin{bmatrix} 1 & -2 & 0 \\ 2 & -1 & 3 \\ 1 & 4 & 0 \end{bmatrix} \cdot \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 10 \\ 0 \\ -7 \end{bmatrix}$

(e) NOTA

(15) True or False? Consider the following two statements:

I. Every square matrix has an inverse.

II. If $B = A^{-1}$, then $AB = BA$.

(a) both I and II are true

(b) I is true, II is false

(c) I is false, II is true

(d) both I and II are false