Department of Mathematics

MA162 Chapter 2 Makeup Exam
June 28, 2010

DO NOT TURN THIS PAGE UNTIL INSTRUCTED TO DO SO.

Instructions: Be sure that your name, section number, and student ID are filled in below. Cell phones must be OFF and put away before you open this exam. You may use calculators (including graphing calculators, but no laptops or cellphone calculators) for checking numerical calculations, but you must show your work to receive credit. Put your answers in the answer boxes provided, and show your work. If your answer is not in the box or if you have no work to support your answer, you will receive no credit. The test has been carefully checked and its notation is consistent with the homework problems. No additional details will be provided during the exam.

Problem	**Maximum**	**Actual**
1	20	
2	20	
3	20	
4	20	
5	20	
Total	100	

Name: _____
Section: 020
Last four digits of Student ID: _____

1. For what value of k is the system

$$\left[\begin{array}{rcrcrcr} x & + & 2y & + & 3z & = & 4 \\ 3x & + & 7y & + & 3z & = & 11 \\ & & 4y & + & kz & = & 17 \end{array}\right]$$

inconsistent (i.e. has no solution)?

$k =$

2. Given the system of equations

$$\left\{\begin{array}{rcrcrcrcr} x & + & 3y & + & 5z & + & 7w & = & 9 \\ -3x & & & - & 8z & - & 16w & = & -24 \\ -2x & + & 3y & + & 2z & - & 2w & = & -6 \end{array}\right\}$$

a) Write the augmented matrix for the system.

b) Carry out standard row reductions to convert the augmented matrix to REF (row echelon form). Be sure to describe your reductions in standard notation. Just giving the final form will receive no credit.

3. Here is the augmented matrix of a linear system of equations. Take this matrix to RREF. Be sure to label your reduction operations in standard notation. You need not solve for the variables.

$$\left(\begin{array}{cccc|c} x & y & z & w & \text{RHS} \\ \hline 9 & 8 & 6 & 5 & 4 \\ 0 & 4 & 5 & 2 & -1 \\ 0 & 0 & 1 & 2 & 3 \end{array}\right)$$

4. Here is the augmented matrix of a linear system of equations. As usual, the variables are mentioned for your convenience.

$$\left(\begin{array}{cccc|c} x & y & z & w & \text{RHS} \\ \hline 1 & 0 & 7 & 0 & 3 \\ 0 & 1 & 8 & 0 & 4 \\ 0 & 0 & 0 & 1 & 5 \end{array}\right)$$

(a) Is this matrix in REF or RREF or neither of these?

(b) Finish the solution process as needed and determine the complete solution of the system by filling in the answers below. If a variable is free, then enter the word "free" as its value. Be sure to show all calculations.

$x =$

$y =$

$z =$

$w =$

5. For the following word problem: (a) Write down variables describing the (numerical) business decision to be made, (b) write down equations that constrain your decision, (c) convert the equations to an augmented matrix. **You need not solve the system.**

Mrs. Oregano runs a spaghetti storehouse, but wants to clear it out before she goes out of business. She has a rather large inventory of fabulous flour, tasty tomatoes, and glorious garlic. She decides she is going to use every last bit of her inventory to make the 2010 Oregano Outdoor Feast! Her feast only includes Spaghetti, Bruschetta, and Ziti. Flour is used in all three dishes: 1/8 cup per Spaghetti dinner, 3/4 cup per Bruschetta plate, and 1/4 cup per Ziti dinner. Tomatoes get used in all three dishes too: 1 cup per Spaghetti dinner, 1/2 cup per Bruschetta plate, and 1 cup per Ziti dinner. Actually garlic gets used in all three dishes too: 2 cloves per Spaghetti dinner, 1 clove per Bruschetta plate, and 1.5 cloves per Ziti dinner. MrsȮregano has 80 cups of flour, 160 cups of tomatoes, and 300 cloves of garlic. How many dishes of each type should she make in order to use up all of her inventory?

The variables describing the decision are:

The equations to be solved are:

The augmented matrix describing the equations is: