Simon M. Foucher **Assignment 2** **MATH133, Fall 2006**
due 10/1/06 at 11:00 PM.

1.(2 pts) For each system, determine whether it has a unique solution (in this case, find the solution), infinitely many solutions, or no solutions.

1.

$$\begin{array}{rrcr} -2x & +4y & = & 14 \\ -6x & +12y & = & 42 \end{array}$$

- A. Unique solution: $x = 0,\ y = 0$
- B. Unique solution: $x = 14,\ y = 42$
- C. Unique solution:$x = \frac{14}{-2},\ y = 0$
- D. No solutions
- E. Infinitely many solutions
- F. None of the above

2.

$$\begin{array}{rrcr} 7x & +6y & = & 33 \\ -5x & -7y & = & -10 \end{array}$$

- A. No solutions
- B. Unique solution: $x = 9,\ y = -5$
- C. Unique solution: $x = 0,\ y = 0$
- D. Infinitely many solutions
- E. Unique solution: $x = -5,\ y = 9$
- F. None of the above

3.

$$\begin{array}{rrcr} -5x & +6y & = & 0 \\ 7x & -3y & = & 0 \end{array}$$

- A. Infinitely many solutions
- B. Unique solution: $x = 0,\ y = 0$
- C. Unique solution: $x = 1,\ y = 4$
- D. Unique solution: $x = +3,\ y = -5$
- E. No solutions
- F. None of the above

4.

$$\begin{array}{rrcr} 3x & +2y & = & -8 \\ -3x & -2y & = & 9 \end{array}$$

- A. Unique solution: $x = 0,\ y = 0$
- B. Unique solution: $x = -8,\ y = 9$
- C. Infinitely many solutions
- D. No solutions
- E. Unique solution: $x = 9,\ y = -8$
- F. None of the above

2.(1 pt) For what value(s) of k (if any) will the system

$$\begin{array}{rl} kx + 6y & = -15 \\ 10x + 4y & = -10 \end{array}$$

have
(a) no solution: ____ (enter NA if no such k exists).
(b) infinitely many solutions: ____ (enter NA if no such k exists).
(c) for all other values of k the system has ____ solution(s).

3.(1 pt) For what value(s) of k (if any) will the system

$$\begin{array}{rl} kx - 9y & = -3 \\ 3x - 3ky & = +3 \end{array}$$

have
(a) no solution: ____ (enter NA if no such k exists).
(b) infinitely many solutions: ____ (enter NA if no such k exists).
(c) for all other values of k the system has ____ solution(s).

4.(2 pts) The parametric equations of the line of intersection of the two planes
$2x + 4y - 6z = 4$ and $10x + 21y + 4z = -3$
found by Gauss-Jordan elimination are
$x =$____+____t
$y =$____+____t
$z =$____+____t

5.(2 pts) The reduced row echelon form of the matrix

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

is

$$\begin{bmatrix} \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ \end{bmatrix}$$

6.(2 pts) The reduced row echelon form of the matrix

$$A = \begin{bmatrix} 1 & 3 & 8 & 5 \\ 2 & 7 & 20 & 12 \\ 3 & 9 & 24 & 16 \end{bmatrix}$$

is

$$\begin{bmatrix} \_\_ & \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ & \_\_ \\ \_\_ & \_\_ & \_\_ & \_\_ \end{bmatrix}$$

7.(2 pts)
Solve the system by means of Gauss-Jordan elimination

$$\begin{array}{rrrcr} 1x & -1y & -4z & = & 7 \\ -3x & +4y & +13z & = & -24 \\ -3x & +3y & +13z & = & -21 \end{array}$$

$x =$ ___
$y =$ ___
$z =$ ___

8.(3 pts) The solution of the linear system

$$\begin{array}{rrrrl} 1x_1 & +0x_2 & -2x_3 & +1x_4 & = -8 \\ -1x_1 & +1x_2 & +3x_3 & -1x_4 & = 4 \\ -5x_1 & +2x_2 & +12x_3 & -4x_4 & = 27 \end{array}$$

found by Gauss-Jordan elimination is
$x_1 =$____+____t
$x_2 =$____+____t
$x_3 =$____+____t
$x_4 =$____+____t

9.(1 pt) Using Gauss-Jordan elimination, solve the system

$$\begin{cases} 5x_1-4x_2+4x_3+4x_4=4 \\ -x_1+x_2+3x_3+3x_4=1 \\ 4x_1-3x_2+7x_3+7x_4=5 \\ -2x_1+2x_2+6x_3+6x_4=2 \end{cases}$$

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \end{pmatrix} = \begin{pmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{pmatrix} + \begin{pmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{pmatrix} s + \begin{pmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{pmatrix} t.$$

A complete solution to this problem is one of the two problems to be handed in with Written Assignment 2.

10.(1 pt) Using Gauss-Jordan elimination, solve the system

$$\begin{array}{l} x_1-4x_2-2x_3 \qquad +3x_5+2x_6=-1 \\ \qquad\qquad\qquad -x_4-4x_5-4x_6=6 \\ x_1-4x_2 \qquad\qquad -5x_5-6x_6=-1 \end{array}$$

$$\begin{pmatrix} x_1 \\ x_2 \\ x_3 \\ x_4 \\ x_5 \\ x_6 \end{pmatrix} = \begin{pmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{pmatrix} + \begin{pmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{pmatrix} s + \begin{pmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{pmatrix} t + \begin{pmatrix} \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \\ \_\_ \end{pmatrix} u.$$