

Math 115 Spring 2015: Assignment 3

Due: at the tutorial Thursday 5/28

Last name:

First name:

ID number:

Note: You need to show all the steps and the reasoning in obtaining your answers in order to receive full marks.

1. Consider the following system of linear equations

$$\begin{array}{rcccccc} & & & 2x_3 & + & 1x_4 & - & 3x_5 & = & 2 \\ x_1 & + & 3x_2 & - & x_3 & & & + & 4x_5 & = & 2 \\ 2x_1 & + & x_2 & - & x_3 & - & x_4 & + & 2x_5 & = & -1. \end{array}$$

- (a) [2 marks] Write the augmented matrix for this system of linear equations.
- (b) [8 marks] Solve this system using elementary row operations (indicate which operations you are using). Write down the set of all solutions to this system.
2. Consider the system of linear equations with the following augmented matrix:

$$\left[\begin{array}{ccc|c} 3 & q^2 & -p & 1 \\ 0 & q & 0 & p \\ 0 & 0 & p & pq \end{array} \right]$$

- (a) [3 marks] Determine the values that p and q must take for this system to be consistent with exactly one solution.
- (b) [3 marks] If it has exactly one solution (x_1, x_2, x_3) , then give x_1 , x_2 and x_3 in function of p and q .
- (c) [2 marks] Determine the values that p and q must take for this system to be inconsistent.
- (d) [2 marks] Determine the values that p and q must take for this system to be consistent with infinitely many solutions.