First Name: Last Name: KEY

Math 25 - Fall 2016

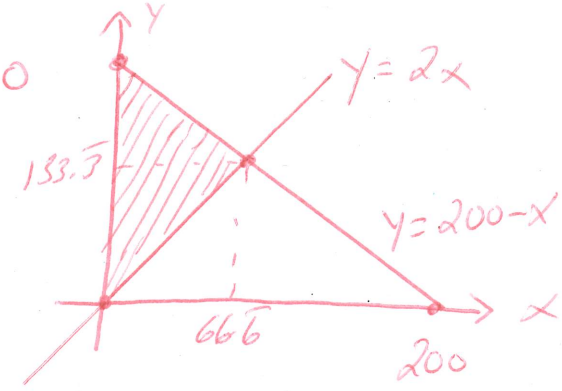
Quiz 5: Monday September 12, 2016

1. (3 points) A school carnival fundraiser has a event that can host 200 people. Admissions tickets for students are one dollar and admission for adults is two dollars. For every two students, there must be at least 1 adult. How many adults and students should attend the event to maximize the amount of money made?

x = # students
y = # adults

$f(x,y) = x + 2y$ (profit)

$x + y \leq 200$
$x \geq 0$
$y \geq 0$
$x \leq y/2$



$f(0,0) = 0$

$f(0,200) = 400$

$f(66.6, 133.3) = 333.2$

$\Rightarrow$ 0 students, 200 adults

$200 - x = 2x$
$200 = 3x$
$66.6 = x$
$133.3 = y$

2. (3 points) Write the following system as an augmented matrix:

$$\begin{cases} x - 3y + 3z = -4 \\ 2x + 3y - z = 15 \\ 4x - 3y - z = 19 \end{cases}$$

$$\left[\begin{array}{ccc|c} 1 & -3 & 3 & -4 \\ 2 & 3 & -1 & 15 \\ 4 & -3 & -1 & 19 \end{array}\right]$$

Please, show all work.

3. (3 points) Row reduce the augmented matrix from problem 2 into reduced row echelon form to solve the system.

$$\left[\begin{array}{ccc|c} 1 & -3 & 3 & -4 \\ 0 & 9 & -7 & 23 \\ 0 & 9 & -13 & 35 \end{array}\right] \longrightarrow \left[\begin{array}{ccc|c} 1 & -3 & 3 & -4 \\ 0 & 1 & -7/9 & 23/9 \\ 0 & 9 & -13 & 35 \end{array}\right] \rightarrow \left[\begin{array}{ccc|c} 1 & 0 & 2/3 & 11/3 \\ 0 & 1 & -7/9 & 23/9 \\ 0 & 0 & -6 & 12 \end{array}\right]$$

$$\longrightarrow \left[\begin{array}{ccc|c} 1 & 0 & 2/3 & 11/3 \\ 0 & 1 & -7/9 & 23/9 \\ 0 & 0 & 1 & -2 \end{array}\right] \longrightarrow \left[\begin{array}{ccc|c} 1 & 0 & 0 & 5 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & -2 \end{array}\right]$$

$$\Rightarrow \boxed{\begin{array}{l} x = 5 \\ y = 1 \\ z = -2 \end{array}}$$

4. (3 points) Solve the following system using Gaussian elimination or Gauss-Jordan elimination

$$\begin{cases} x - 3y + z = 4 \\ 2x - 8y + 8z = -2 \\ -6x + 3y - 15z = 9 \end{cases}$$

$$\left[\begin{array}{ccc|c} 1 & -3 & 1 & 4 \\ 2 & -8 & 8 & -2 \\ -6 & 3 & -15 & 9 \end{array}\right]$$

use same procedure as #3

$$\Rightarrow \left[\begin{array}{ccc|c} 1 & 0 & 0 & 3 \\ 0 & 1 & 0 & -1 \\ 0 & 0 & 1 & -2 \end{array}\right] \Rightarrow \boxed{\begin{array}{l} x = 3 \\ y = -1 \\ z = -2 \end{array}}$$

Please, show all work.