Math 304 Spring 2010
1/28/2010
Quiz #1

Name: Key

Show all work clearly and in order. Please box your answers. 10 minutes.

[2] 1. Which of the following is NOT a *linear combination* of x_1, x_2, x_3 and x_4? (Circle one).

A. $x_1 + 2x_2 + x_4$
B. $x_2 + x_3 + x_4$
C. $x_1 - x_2 + x_3 + 2x_4$
D. $2x_1 + 2\sqrt{x_2} + 3(x_3)^{(1/3)} + x_4$
E. $x_1 + x_2 + x_3 + \pi x_4$

remember: coefficients may be zero!

[2] 2. Which of the following is a *linear equation* of variables x_1 and x_2? (Circle one).

A. $3x_1x_2 = 7$ ← NOT Linear Equations
B. $3(x_1)^2 + 2(x_2)^2 = 6$ ← NOT Linear Equations
C. $3x_1 + 2x_2$ ← NOT an equation
D. $3\sqrt{x_1} + 2\sqrt{x_2} = 6$ ← NOT Linear Equations
E. $3x_1 + 2x_2 = 6$

[3] 3. Using any method find the solution set to the system of linear equations:

$$3x_1 + x_2 = 1$$
$$x_1 - 2x_2 = 2$$

SOLUTION 1:

$$\left[\begin{array}{cc|c} 3 & 1 & 1 \\ 1 & -2 & 2 \end{array}\right] \xrightarrow{R2 \to R2 - \frac{1}{3}R1} \left[\begin{array}{cc|c} 3 & 1 & 1 \\ 0 & -\frac{7}{3} & \frac{5}{3} \end{array}\right]$$

So $-\frac{7}{3}x_2 = \frac{5}{3} \Rightarrow x_2 = -\frac{5}{7}$ so $3x_1 + x_3 = 1$, $3x_1 + (-5/7) = 1 \Rightarrow x_1 = \frac{4}{7}$

So the solution set has only one solution:

$$x_1 = \frac{4}{7},\ x_2 = -\frac{5}{7}$$

[1] 4. Write the augmented matrix for the system of linear equations:

$$x_1 + x_2 + 3x_3 = 2$$
$$x_1 + 4x_2 + 4x_3 = 2$$
$$4x_1 - 3x_2 - 5x_3 = -3$$

$$\left[\begin{array}{ccc|c} 1 & 1 & 3 & 2 \\ 1 & 4 & 4 & 2 \\ 4 & -3 & -5 & -3 \end{array}\right]$$

SOLUTION 2:

$3x_1 + x_2 = 1 \Rightarrow x_1 = \frac{1}{3}(1 - x_2)$

so $\left(\frac{1}{3}(1 - x_2)\right) - 2x_2 = 2$

$-\frac{7}{3}x_2 = 5/3$

$x_2 = -5/7$

so $x_1 = \frac{1}{3}\left(\frac{+5}{7} + 1\right) = 4/7$

the solution set has only one solution.

$$x_1 = \frac{4}{7},\ x_2 = -\frac{5}{7}$$

[2] 5. Tell me some interesting facts about yourself that will help me get to know you. *Examples: What is your favorite book/movie? What is you favorite music genre? What do you like about your major? What is your favorite programming language? Did you do anything interesting over the break? Another interesting fact about yourself, etc.*