MFADMAT – QUIZ No. 1

Problem Solving. Box your final answer.

1. Solve the ff. system of linear equations using ***ref***. Additional bonus if you will be able to make it to ***rref***.
   a. $3x_1 + x_2 + 2x_3 = 5$
      $4x_1 - 2x_2 + 3x_3 = 1$
      $x_1 + 3x_2 - 4x_3 = -7$

   b. $-3x_1 + 2x_2 - 2x_3 = -10$
      $2x_1 + x_2 + x_3 = 4$
      $x_1 - 2x_2 + 3x_3 = 7$

   c. $2x_1 + 3x_2 - 4x_3 + x_4 = 9$
      $-2x_1 - 4x_2 - 3x_3 + x_4 = -11$
      $x_1 + x_2 + x_3 - 3x_4 = -4$
      $x_1 - 3x_2 + x_3 - x_4 = 5$

2. Write the solution set in parametric vector form.
   a. $x_1 + 2x_2 - 3x_3 = 5$
      $2x_1 + x_2 - 3x_3 = 13$

   b. $-3x_1 + x_2 = -8$
      $5x_2 - x_3 = 2$

   c. $x_1 + 3x_2 - 3x_3 = 7$
      $x_2 - 4x_3 = 5$

   d. $x_1 - 3x_2 - 8x_3 = 5$
      $x_2 + 2x_3 = -4$

3. Balance the following chemical equations:
   a. $\_Zn + \_HCl \rightarrow \_ZnCl_2 + \_H_2$
   b. $\_Na + \_H_2O \rightarrow \_NaOH + \_H_2$

4. Suppose the MEM program has 3 specializations: MRE, BME and ASE. MRE transfers 5% of its student to BME, 30% to ASE and retains the rest. BME sells 20% of its student to MRE, 70% to ASE and retains the rest. ASE transfers 20% of its student to MRE, 30% to BME and retains the rest.
   a. Construct the table for this program.
   b. Find a set of equilibrium for this program.

Bonus: Reduce the ff. linear systems in their *rref*.

a) $\begin{bmatrix} 1 & 2 & 4 & 8 \\ 2 & 4 & 6 & 8 \\ 3 & 6 & 9 & 12 \end{bmatrix}$ b) $\begin{bmatrix} 1 & 2 & 4 & 5 \\ 2 & 4 & 5 & 4 \\ 4 & 5 & 4 & 2 \end{bmatrix}$