Exercises: Systems of Equations with infinite solutions:

Problem #1
A state fish and game department supplies three types of food to a lake that supports three species of fish. Each fish of species #1 consumes each week an average of 1 unit of food #1, 1 unit of food #2 and 2 units of food #3. Each fish of species #2 consumes each week an average of 3 units of food #1, 4 units of food #2 and 5 units of food #3. Each fish of species #3 consumes each week an average of 2 units of food #1, 1 unit of food #2 and 5 units of food #3. Each week 25,000 units of food #1 and 20,000 units of food #2 and 55,000 units of food #3 are supplied to the lake. If we assume that the food is completely eaten, how many fish of each species can coexist in the lake?

Problem #2
A brokerage house offers 3 stock portfolios. Portfolio A consists of 2 blocks common stock and one municipal bond. Portfolio B consists of 4 blocks of common stock, 2 municipal bonds and 3 blocks of preferred stocks. Portfolio C consists of 2 blocks of common stock, one municipal bond and 3 blocks of preferred stock. A customer has ordered 16 blocks of common stock, 8 municipal bonds and 6 blocks of preferred stock. Find the number of each portfolio needed to accommodate the customer’s request.

Problem #3
Three different bacteria are cultured in one dish and feed on three different nutrients. Each individual of species 1 consumes one unit of each of the first and second nutrients and two units of the third nutrient. Each individual of species 2 consumes two units of the first nutrient and two units of the third nutrient. Each individual of species 3 consumes two units of the first nutrient, three units of the second nutrient and five units of the third nutrient. If the culture is given 5100 units of the first nutrient, 6900 units of the second nutrient, and 12,000 units of the third nutrient, how many of each species can be supported so all nutrients are consumed?

Problem #4
An investment company sells three types of pooled funds. Standard (S), Deluxe (D), and Gold Star (G). Each unit of S contains 12 shares of stock A, 16 shares of stock B and 8 of stock C. Each unit of D contains 20 shares of stock A, 12 shares of stock B and 28 of stock C. Each unit of G contains 32 shares of stock A, 28 shares of stock B and 36 of stock C. An investor wishes to purchase exactly 220 shares of stock A, 176 shares of stock B, and 264 shares of stock C by buying units of the three available funds. Determine the combinations of units of S, D, and G which will meet the investor’s requirements exactly.
Problem # 5
A botanist can purchase plant food of 4 different types. Each food come in the same size bag and the following table summarizes the number of grams of each of three nutrients that each bag contains. The botanist wants to use a food that has these nutrients in a different proportion and determines that he will need a total of 10,000 grams of A, 20,000 grams of B, and 20,000 grams of C. Find the number of bags of each type of food that should be ordered.

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<thead>
<tr>
<th>Foods</th>
<th>I</th>
<th>II</th>
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<tr>
<td>A</td>
<td>5</td>
<td>5</td>
<td>10</td>
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<td>B</td>
<td>10</td>
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<td>C</td>
<td>5</td>
<td>15</td>
<td>20</td>
<td>25</td>
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Problem #6
A patient is ordered by the doctor to take 10 units of Vitamin A, 9 units of Vitamin D, and 19 units of Vitamin E each day. The patient can chose from three brands of vitamin pills. Brand X contains 2 units of vitamin A, 3 units of vitamin D and 5 units of vitamin E. Brand Y contains 1 units of vitamin A, 3 units of vitamin D and 4 units of vitamin E. Brand Z contains 1 units of vitamin A and 1 units of vitamin E. Find the combination of pills from brand X, Y, and Z that will provide exactly the required amounts of Vitamins.