Question 1.[1] The Silly Nut Company makes two mixtures of nuts: Mixture A and Mixture B. A pound of Mixture A contains 12 oz of peanuts, 3 oz of almonds and 1 oz of cashews and sells for $4. A pound of Mixture B contains 12 oz of peanuts, 2 oz of almonds and 2 oz of cashews and sells for $5. The company has 1080 lb. of peanuts, 240 lb. of almonds, 160 lb. of cashews. How many pounds of each of mixtures A and B should the company make to maximize profit? (Hint: Use consistent units. Work the entire problem in pounds by converting all values given in ounces into fractions of pounds, 1 lb = 16 oz).

    a. (1 mark) Determine the objective function.

    b. (3 marks) Find the constraints that define the feasible region.

Questions 2.[2] *(4 marks)* Consider the objective function $Z = 4x + 3y$ subject to the following constraints:

$$\begin{cases} x + y \geq 1 \\ x + 2y \leq 4 \\ 2x + y \leq 4 \\ x \geq 0 \\ y \geq 0 \end{cases}$$

If the vertices (corners) of the feasible region are $(1,0), (2,0), (0,2), (0,1), (4/3, 4/3)$. Find the maximum and minimum values of Z and at what (x,y) point they are reached. And justify!

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[1]From https://math.libretexts.org/Bookshelves/Applied_Mathematics/Applied_Finite_Mathematics_(Sekhon_and_Bloom)

[2]modified from WeBWorK

Questions 3.[3] Sketch the feasible region given by the inequalities below. And also find the feasible region vertices (coners). Show your work!

$$\begin{cases} x+y\geq 3 \\ 3x+4y\leq 24 \\ 4x+3y\leq 24 \\ x\geq 0 \\ y\geq 0 \end{cases}$$

$$\begin{cases} x+y\geq 3 \\ 3x+4y\leq 24 \\ 4x+3y\leq 24 \end{cases}$$

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[3]modified from WeBWorK