

Finite Mathematics Exam III (4.1-4.3)

In all problems apply the simplex method. On your paper should be all tableaus or matrices.

1. Maximize $P = 5x + 4y$

Subject to:

$$\begin{aligned}x &\leq 60 \\5x + 4y &\leq 280 \\3x + 5y &\leq 310 \\x &\geq 0 \\y &\geq 0\end{aligned}$$

2. Minimize $C = -5x - 4y$

Subject to:

$$\begin{aligned}x &\leq 300 \\3x + 2y &\leq 1300 \\35x + 25y &\leq 6600 \\x &\geq 0 \\y &\geq 0\end{aligned}$$

3. Geoffrey would like to meet more of his nutritional needs from fresh fruits (He is in depression since McDonald's announced they will no longer super-size.). In particular, his nutritionalist told him he would need to get at least 250 mg of calcium, 500 mg of phosphorus (so his skin would glow) and 10 mg of iron. The recommended fruits are apples, oranges, and bananas. He would also like to watch his caloric intake, so he wants a combination of the fruits that will meet his requirements, but with a minimum of calories. Find the number of each fruit he should eat. The table below has the basic nutritional information for the given fruits.

Fruit	Calories per Fruit	Calcium	Phosphorus	Iron
Apple	70	28 mg	30 mg	.7 mg
Orange	50	36	30	.9
Banana	60	48	30	.6

4. The Parisian Piano Company manufactures pianos in two plants, plant I and plant II. The output of plant I is at most 250/month, whereas the output of plant II is at most 350/month. These pianos are shipped to two warehouses that serve as distribution centers for the company. To fill current and projected orders, warehouse A requires a minimum of 250 pianos/month, warehouse B requires at least 200 pianos/month. The shipping cost of each piano from plant I to warehouse A, warehouse B is \$75 and \$95, respectively. The shipping cost of each piano from plant II to warehouse A and warehouse B is \$105 and \$65, respectively. Determine the shipping schedule that will enable the company to meet the warehouses' requirements while keeping shipping costs at a minimum and what is that minimum cost.

Bonus:

$$\text{Minimize } C = 13x + 12y - 5z$$

Subject to:

$$x + 2y + 3z \leq 25$$

$$3x + y \geq 30$$

$$2x + y + z = 14$$

$$x \geq 0$$

$$y \geq 0$$

$$z \geq 0$$