Problem 5: Situation for a "Fungi"

A biologist is developing two new strains of bacteria. Each sample of Type I bacteria produces 4 new viable bacteria and each sample of Type II produces 3 new viable bacteria. Altogether, at least 240 new viable bacteria must be produced. At least 30, but no more than 60, of the original samples must be Type I. No more than 70 of the samples can be type II. A sample of Type I cost $7 and a sample of Type II costs $3. How many samples of each should be used to minimize the cost? What is the minimum cost?

Variables (*in words*): $x =$ $y =$

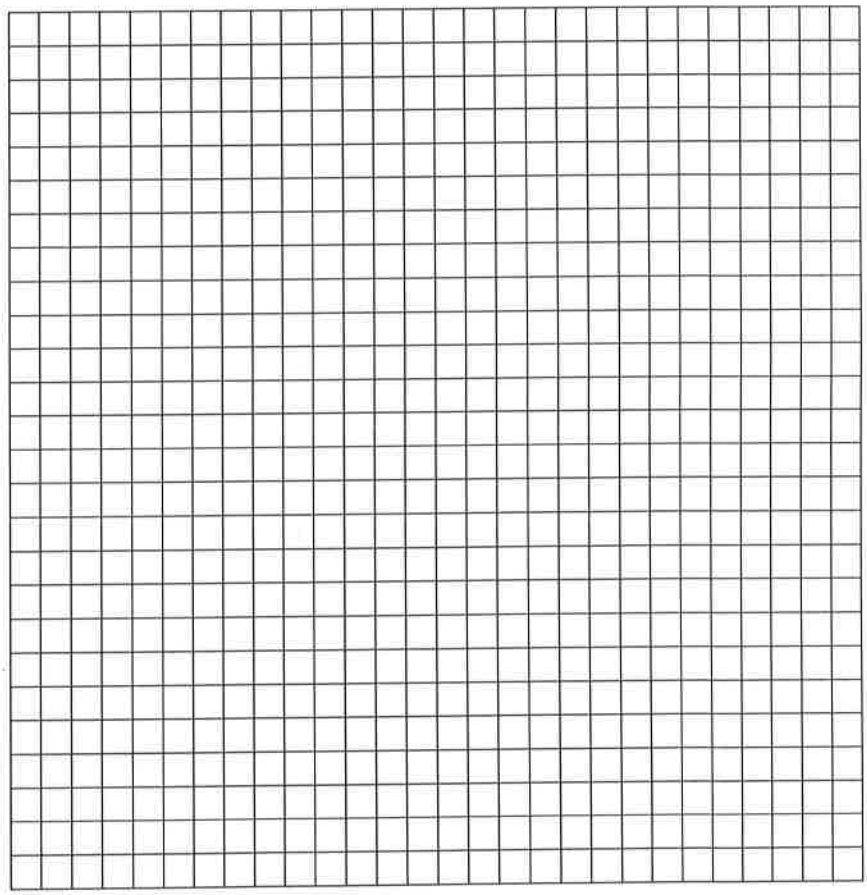
Constraints:

Objective Function:

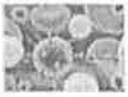
Vertices: of Feasible Region:

Ordered Pair of Optimal Solution:

Minimum Cost:



Problem 5: Situation for a "Fungi"



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Variables (*in words*): *x* = Type I samples **y =** Type II samples

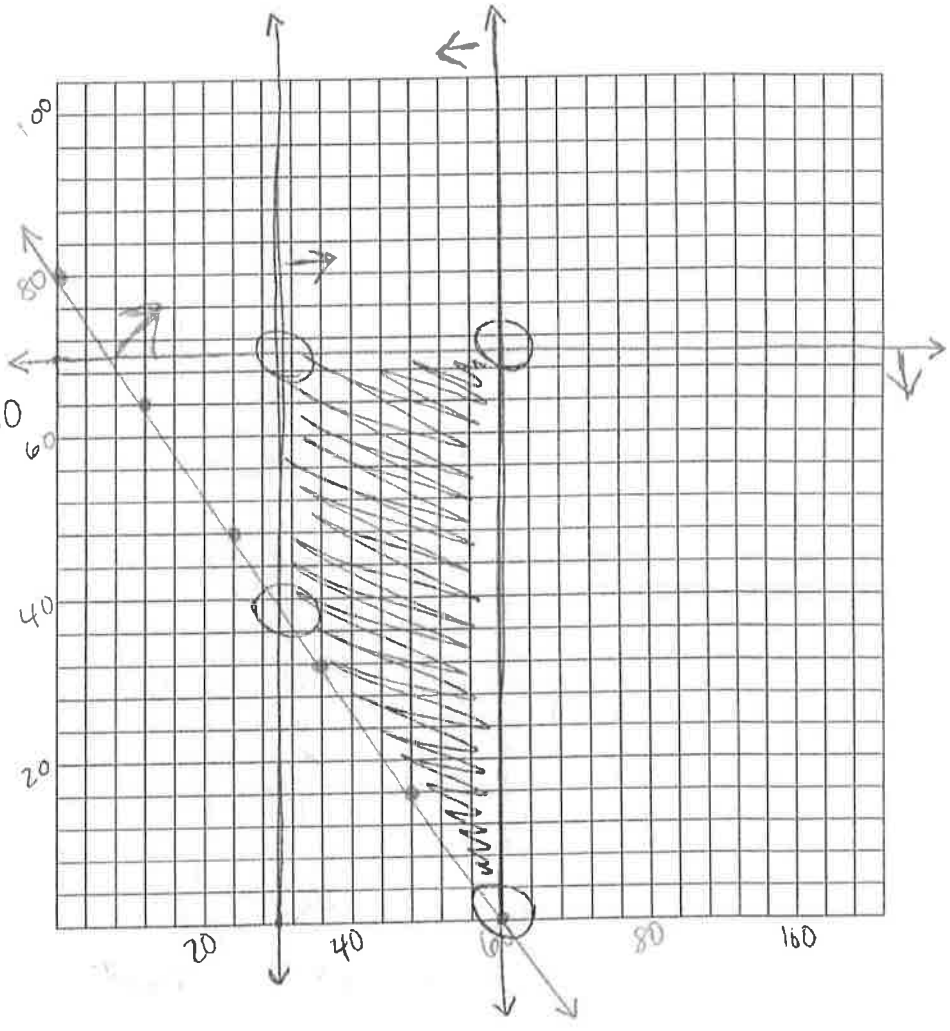
Constraints:

$4x + 3y \geq 240$ → $y \geq \frac{-4}{3}x + 80$

$30 \leq x \leq 60$ → $x \geq 30$, $x \leq 60$

$y \leq 70$

$y \geq 0$



Objective Function:

$C = 7x + 3y$

Vertices: of Feasible Region:

(30,40) (60,0)

(30,70)

(60,70)

Ordered Pair of Optimal Solution:

(30,40) → $330 (60,0) → $420

(30,70) → $420

(60,70) → $630

Minimum Cost:

$330

for 30 Type I samples and 40 Type II samples

Problem 8: Spike for a Goal

A sporting goods manufacturer *Soc-It-To-Ya* makes a profit of $5 on soccer balls and a profit of $4 on volleyballs. Cutting requires 2 hours to make 75 soccer balls and 3 hours to make 60 volleyballs. Sewing needs 3 hours to make 75 soccer balls and 2 hours to make 60 volleyballs. Cutting has 500 hours available and Sewing has 450 hours available. How many soccer balls and volleyballs should be made to maximize profit? What is this profit?

Variables (*in words*): x = **y =**

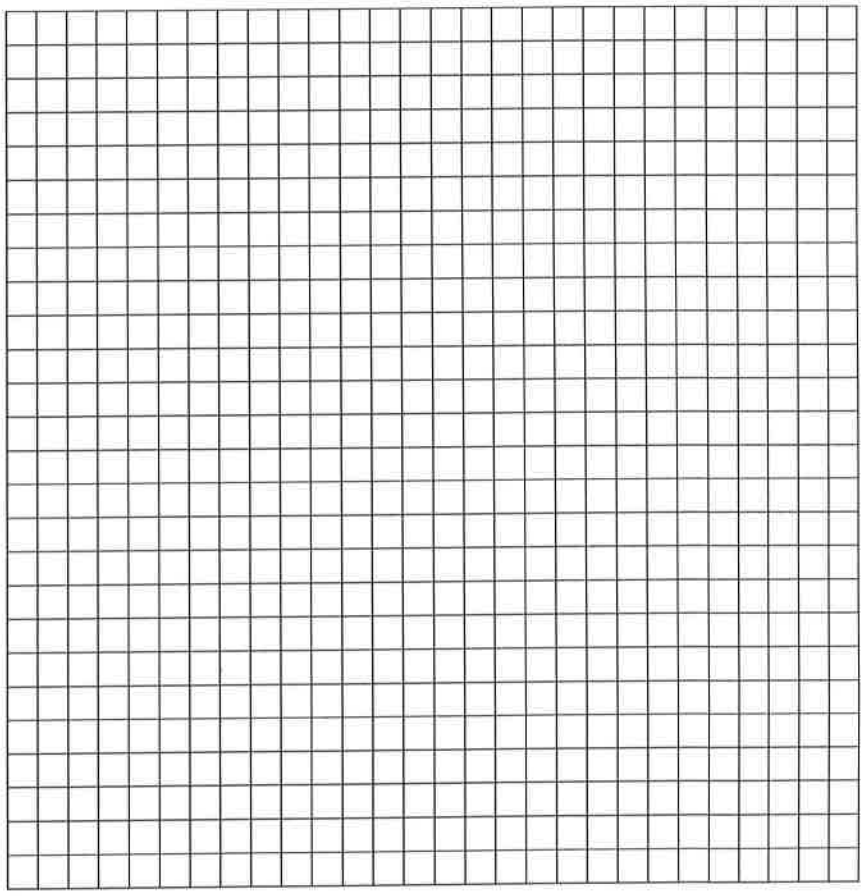
Constraints:

Objective Function:

Vertices: of Feasible Region:

Ordered Pair of Optimal Solution:

Maximum Profit:



Hint: You will need to think about how long it takes to make ONE soccer ball or volleyball (Fractions!)

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Variables (*in words*): x = soccer balls y = volleyballs

Constraints:

$\frac{2}{75}x + \frac{3}{60}y \leq 500$ → $y \leq \frac{-8}{15}x + 10{,}000$

$\frac{3}{75}x + \frac{2}{60}y \leq 450$ → $y \leq \frac{-6}{5}x + 13{,}500$

$x \geq 0$ $y \geq 0$

Objective Function:

$P = 5x + 4y$

Vertices: of Feasible Region:

(0,0) (5250, 7200)

(0, 10000) (11250, 0)

Ordered Pair of Optimal Solution:

(0,0) → $0

(5250, 7200) → $55,250

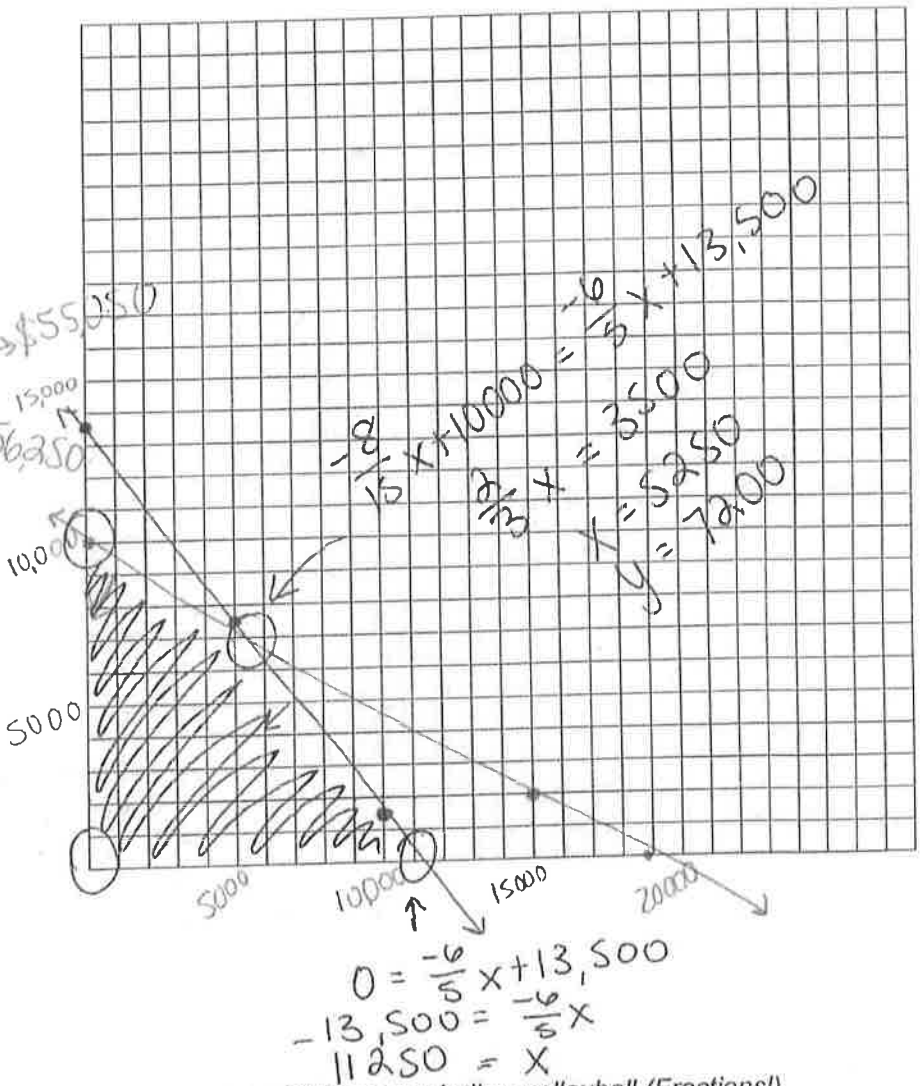
(11250, 0) → $56,250

(0, 10000) → $40,000

Maximum Profit:

$56,250

for 11,250 soccer balls only



Hint: You will need to think about how long it takes to make ONE soccer ball or volleyball (Fractions!)