ADM 2302 09/29/2014

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6481176 Assignment 1

1a. Decision Variables: x1 is money to be invested in stock A

x2 is money to be in invested in stock B

Objective Function: Max Profit: 2x1+1.50x2

Constraints: x1+x2 <= 10

0.3x1+0.2x2 <= 2.50

x1 >= 0   x >= 0

1b. Graph

1c. The optimal solution is 2(5) + 1.50(5) = 17.5 which is the maximum profit that can be obtained without exceeding the potential loss of 2.50. Therefore, the investor should invest 5$ in to stock A, and 5$ in to stock B.

2a. Optimal solution is 3x + y = 9.25

Optimal value is 3(2.5) + 2.25 = 9.25 (2.5,2.25) or 3(2.65) + 1.3 = 9.25 (2.65,1.3)

These solutions are optimal because they each represent the maximum value possible for the objective function while satisfying every constraint.

2b. The minimum optimal solution is 3x + y = 5 and the optimal value is 3(1)+2 = 5   (1,2)
This solution is optimal because it represents the minimum possible value for the objective function while satisfying every constraint.

3a. Optimal Solution is 4x + y = 32

Optimal Value is 4(6)+8=32 (6.8)

This solution is optimal because it represents the maximum value possible for the objective function while satisfying every constraint.

3b. Adding the constraint x + y <=0 does not change the maximum solution. The objective function line will eventually meet with x + y <= 0 line, and that intersection point will be the new optimal value which when plugged in to the optimal solution, will still result in the maximum of 32. The Y value will simply be negative. 4(10.67) – 10.67 = 32

4a. Optimal Solution is 4x +2y = 10
Optimal Value is 4(1) +2(3) = 10 (1,3)

This solution is the optimal one because it represents the minimum value possible for the objective function while satisfying every constraint.

4b. Changing the objective function to maximize 4x + 2y =10 changes the optimal solution to 4x +2y = 14 and the optimal value becomes 4(1.5) + 2(4) = 14 (1.5, 4). This new solution represents the maximum value possible for the objective function while satisfying every constraint.

5a. The optimal solution is 3x – y = 4
Optimal Value is 3(2) – 2 = 4 (2,2)
I discovered this optimal point simply by observing where the two constraint functions closest to the origin intersect (x-y >=0 and x+5y<=12) These constraints intersect at point 2,2, which is the maximum point in the feasible region, therefore why I chose it to be the optimal point.

5b. x-2y <=6 is a redundant constraint. This constraint redundant because removing it from the problem would have no effect on the optimal point or the optimal solution. It does not in any way define the solution space.

5c. x-2y<=6 , x+4y <= 10, and x+3y <=9 can all be removed without effecting the optimal point or solution mainly because each of them are cancelled out by the constraint x-y >= 0 .

6a. Graph

6b. The optimal solution is 2x+6y = 8
The optimal value is 2(2.5) + 6(0.50) = 8 (2.5,0.5)
I discovered this optimal solution by observing the intersection point between the constraints x-y>=2 and 5x+4y=15. This is the maximum value in the feasible region that also satisfies every constraint. You can also find other acceptable solutions by moving your way down the 5x+4y=15 constraint function so long as it remains in the feasible region. However, point (2.5,0.5) represents the maximum value therefore I recognized it as the optimal solution.

6c. The minimum solution is 2x+6y =4
The optimal value is 2(2) + 6(0) = 4

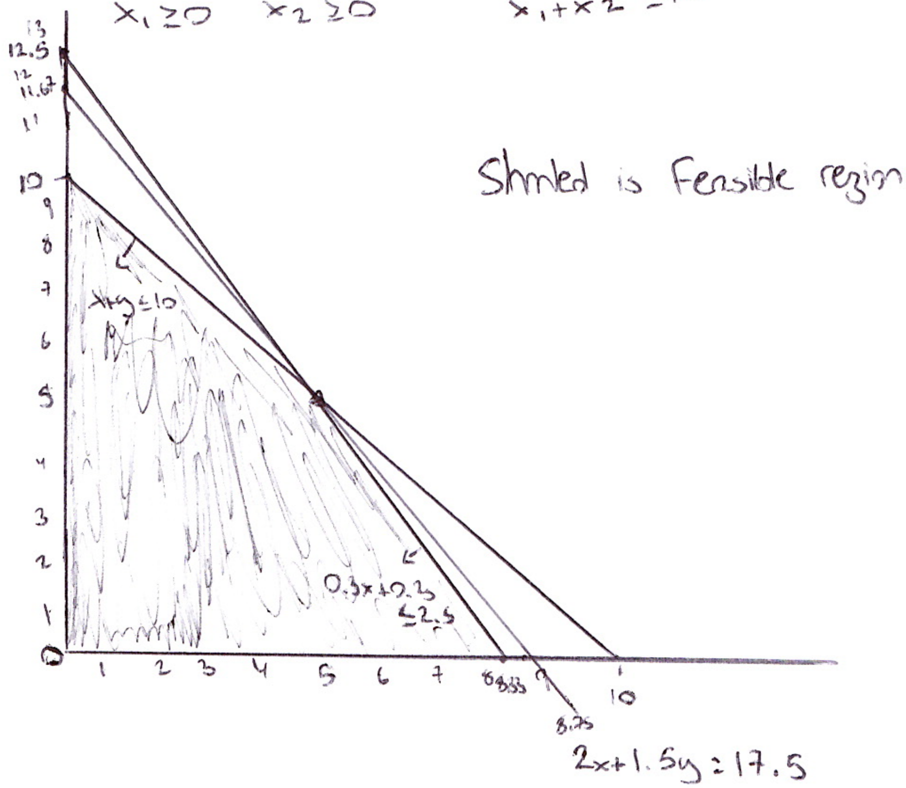
This is optimal point is the intersection between the constraints x-y>=2 and x-3y<=2 and it represents the lowest possible value while satisfying all other constraints. It is the lowest point in the feasible region.

1) b) Decision Variables: x_1, x_2

Max Profit: $2x_1 + 1.50x_2$

Constraints: $0.3x_1 + 0.2x_2 \leq 2.50$

$x_1 \geq 0$ $x_2 \geq 0$ $x_1 + x_2 \leq 10$



2a) Maximize $3x+y$

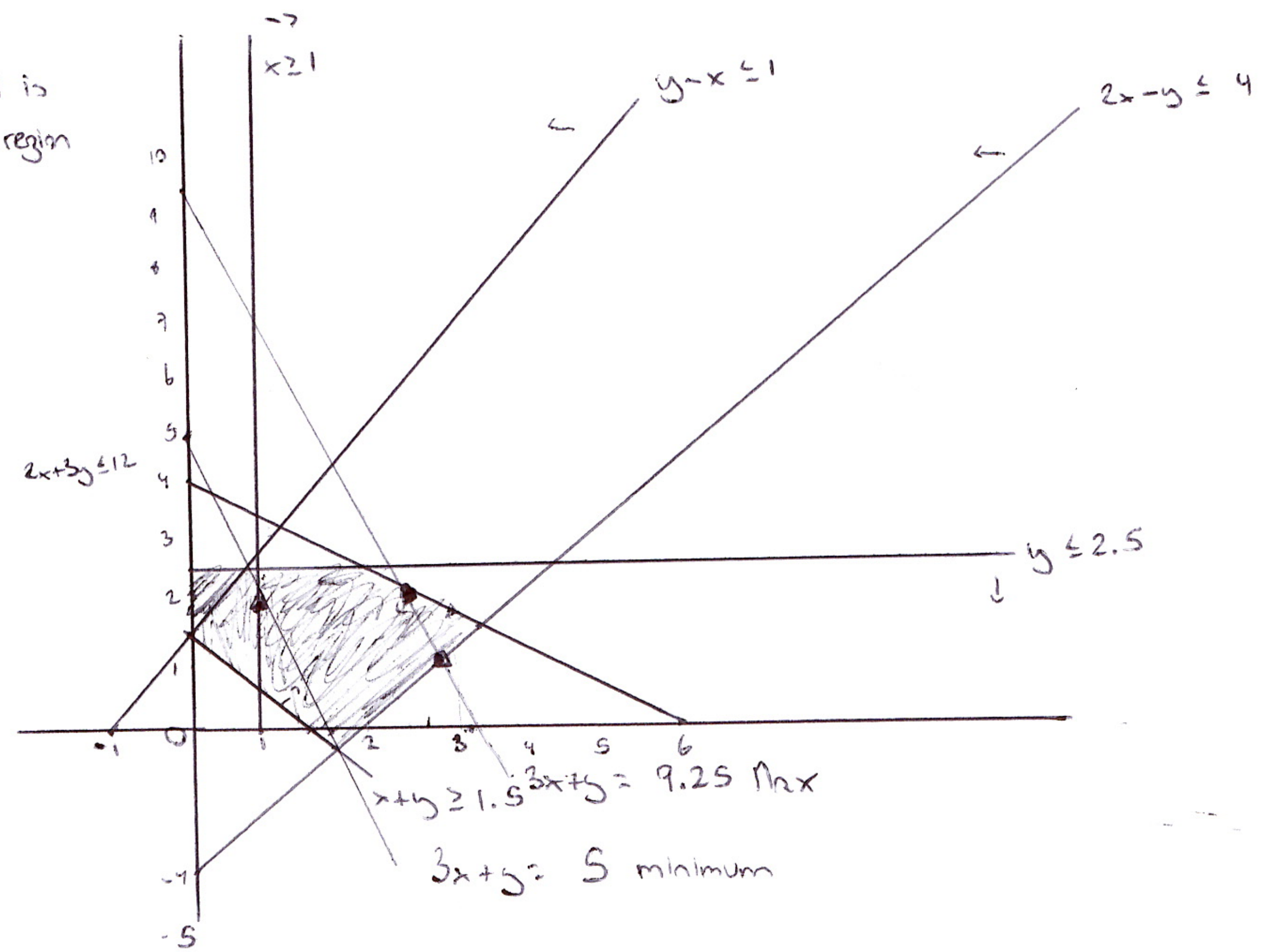
Constraints $2x-y \le 4$ $\quad x \ge 1$

$2x+3y \le 12$ $\quad y \le 2.5$

$x+y \ge 1.5$ $\quad y-x \le 1$

$x \ge 0$ $\quad y \ge 0$

Shaded is Feasible region



3a) Maximize $4x+y$

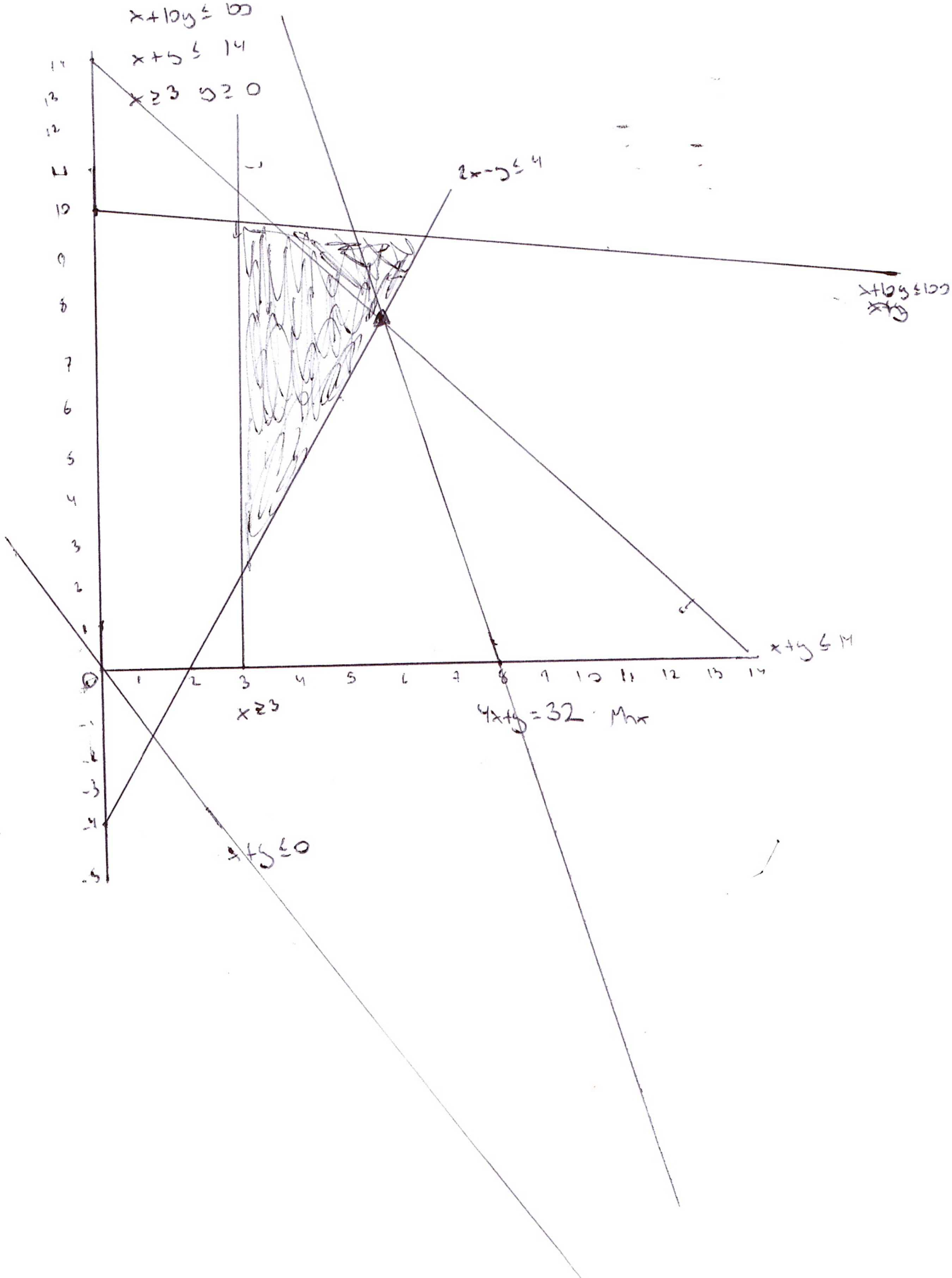
Constraints: $2x-y \leq 4$

$x+10y \leq 100$

$x+y \leq 14$

$x \geq 3 \quad y \geq 0$

Shaded is Feasible region



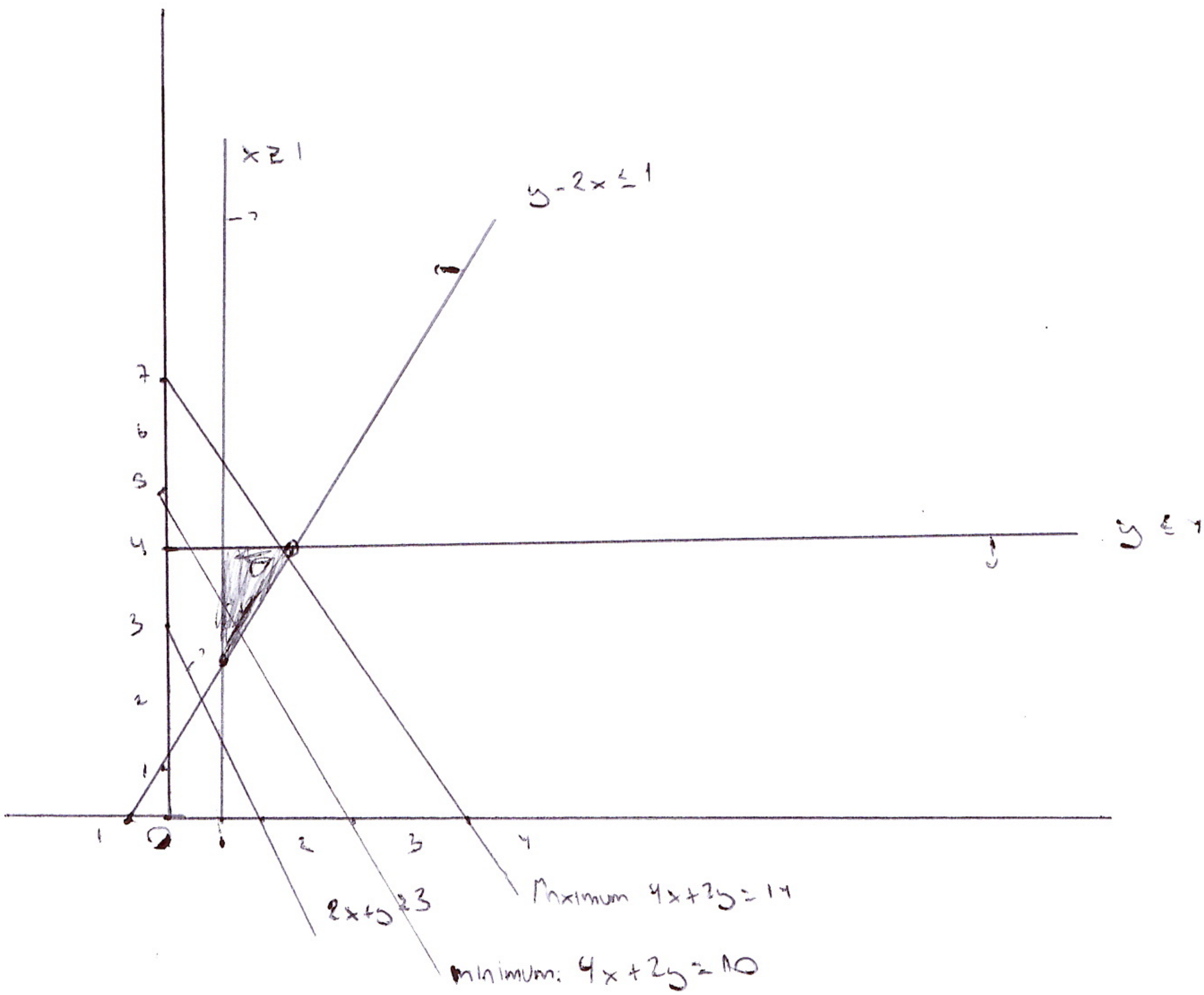
4e) Minimize $4x+2y$

Constraints $2x+y \geq 3$

$y-2x \leq 1$

$x \geq 1 \quad y \leq 4 \quad y \geq 0$

Shaded is Feasible region



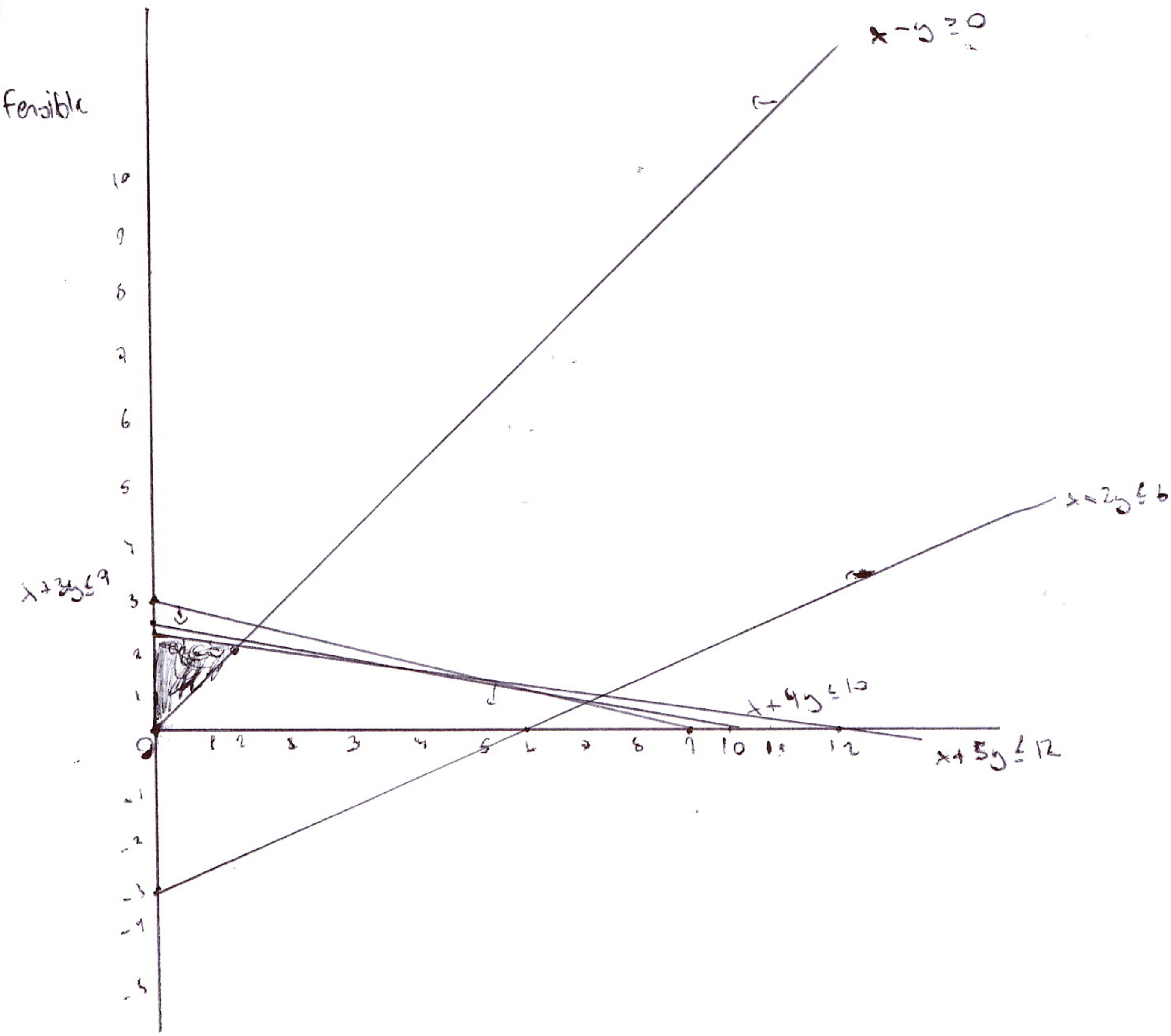
5a) Maximize $3x-y$

Constraints $x-y \geq 0$ $\quad x+3y \leq 9$

$x+4y \leq 10$ $\quad x+5y \leq 12$

$x-2y \leq 6$ $\quad x \geq 0 \quad y \geq 0$

Shaded region is feasible



Maximize $2x + 6y$

Constraints $x - y \geq 2$ $\quad 5x + 4y = 15$

$x - 3y \leq 2 \quad x \geq 0 \quad y \geq 0$

Shaded region is Feasible

6 a)