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Problem: Solve the following LP problem graphically by enumerating the corner points.

MAX: $3X_1 + 4X_2$

Subject to: $X_1 \leq 12$

$X_2 \leq 10$

$4X_1 + 6X_2 \leq 72$

$X_1, X_2 \geq 0$

Answer:

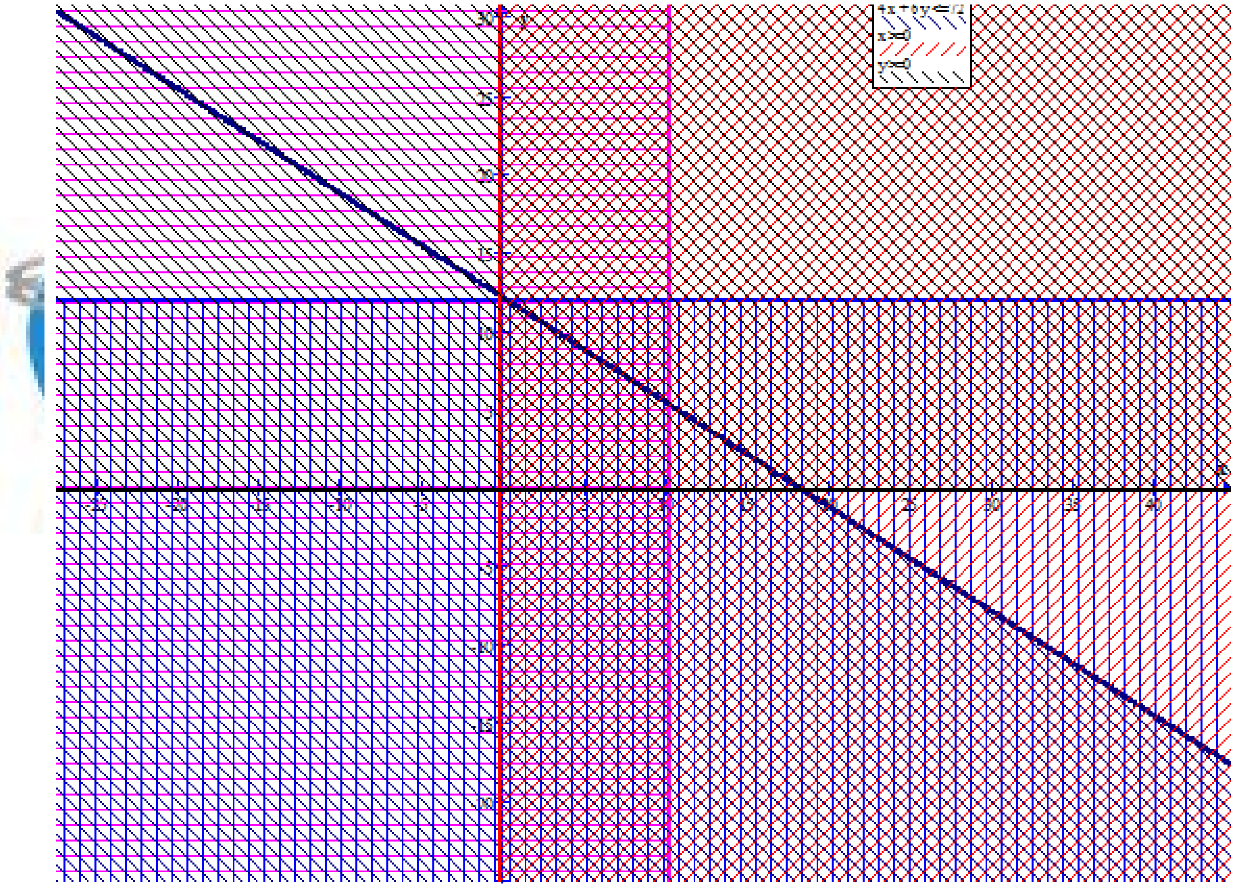
Since the problem is maximization. First we will draw constraints graphically

From first constraint

For $X_1 \leq 12$, draw a line of $X_1 = 12$. (See Purple line in the graph)

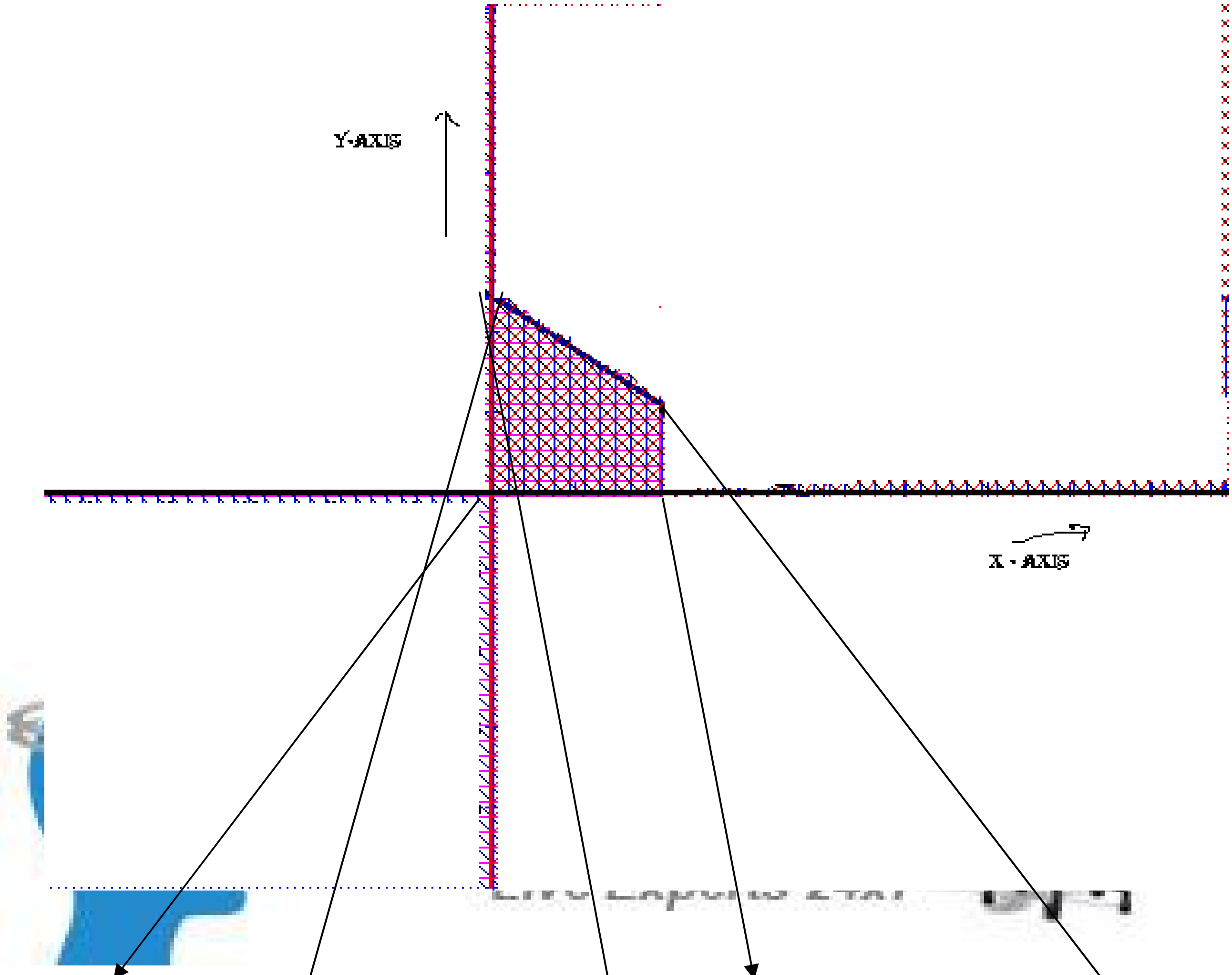
For $X_2 \leq 10$, draw a line of $X_2 = 10$ (See Blue line in the graph)

For $4X_1 + 6X_2 \leq 72$, draw a line $4X_1 + 6X_2 = 72$ (see Brown line in the graph)



Feasible region is shown in the following graph

A



O(0,0) C(3, 10) D(0, 10) A(12, 0)

B(12, 4)

Thus corner points are 0 (0,0), A(12, 0), B(12, 4) , C(3,10) and D(0, 10). Note that O(0,0) is intersection of x1 = 0, x2 = 0 , A (12, 0) is intersection of x1 = 12, x2 = 0, B(12,4) is intersection of x1 = 12, 4x1 + 6x2 = 72 , it gives (12, 4) , C (3, 10) is intersection of x1 = 10, 4x1 + 6x2 = 72. and D(0, 10) is intersection of x1 = 0, x2 = 10 .

At corner points, objective function will be

O(0,0) , 3(0) + 4(0) = 0

A(12, 0), 3(12) + 4(0) = 36

B(12,4), 3(12) + 4(4) = 52

C(3,10), 3(3) + 4(10) = 49

D(0, 10), 3(0) + 4(10) = 40

Thus we may see that at B(12, 4) , value of objective function is maximum. Thus optimal solution is (12,4) and maximize = 52.