Consider the following problem:

$$\text{Maximize } f(x_1, x_2) = x_1 + 2x_2$$

$$\text{Subject to: } x_1 + x_2 \leq 4$$

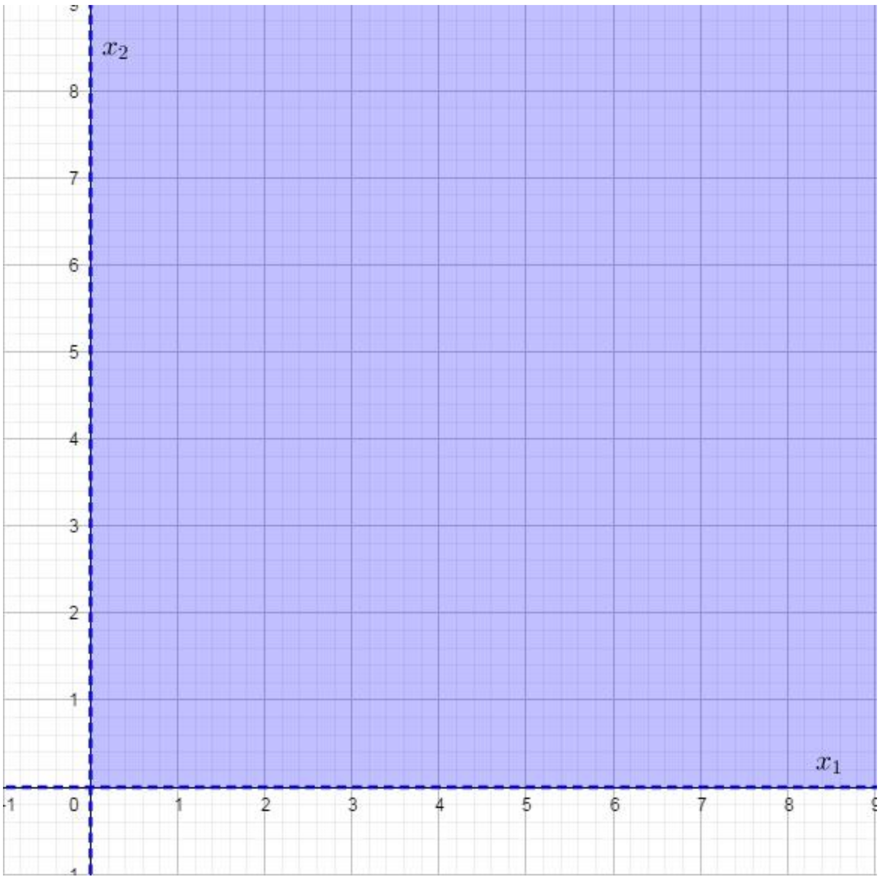
$$x_1 \leq 2$$

$$x_2 \leq 2$$

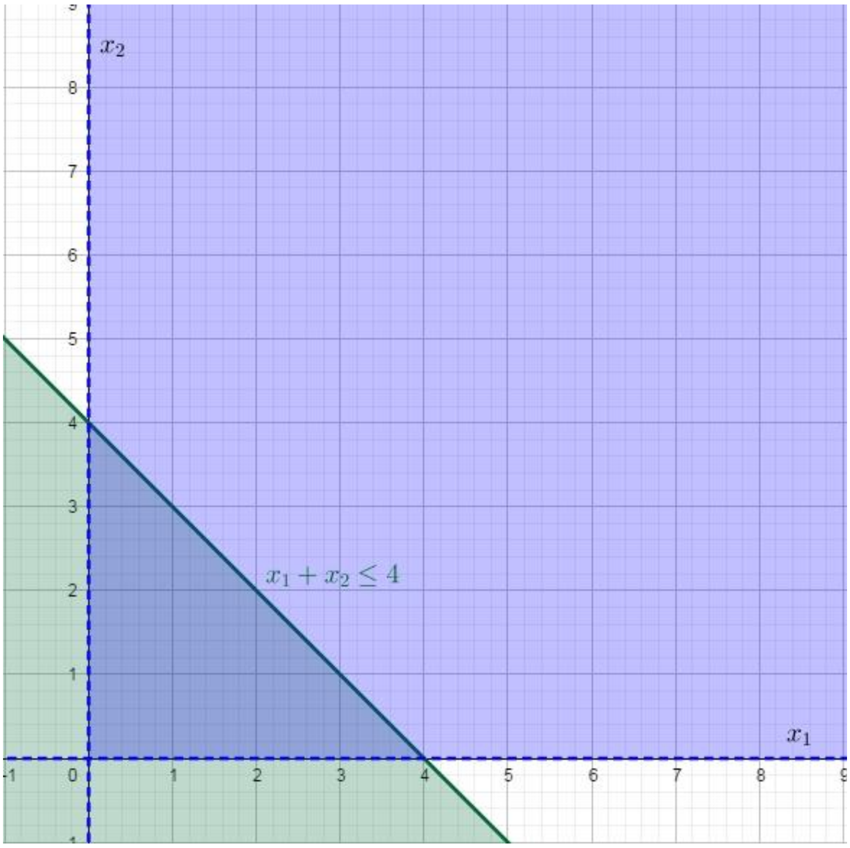
$$x_1 > 0, x_2 > 0$$

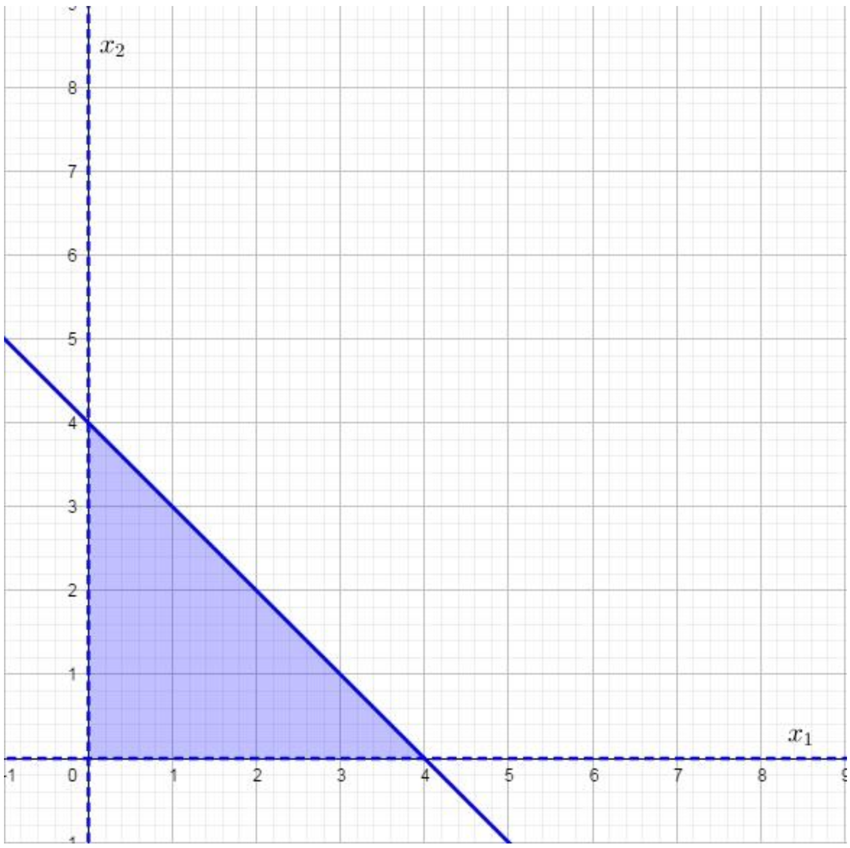
In this problem with only two variables, we can plot our regions and see what happens.

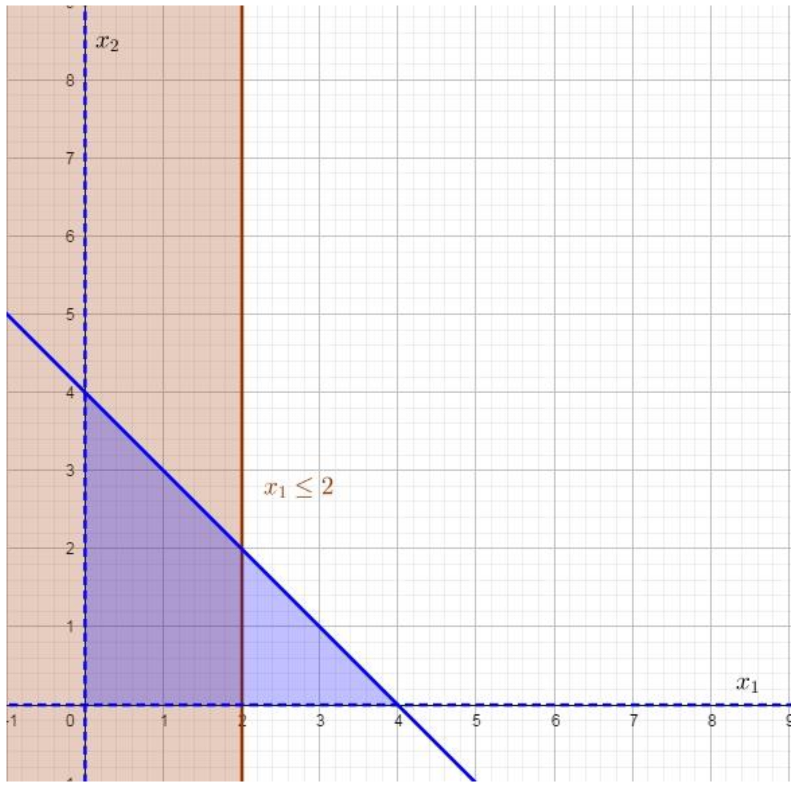
First, we need to add our constraints; the first one should be $x_1 > 0, x_2 > 0$, as can be seen below.

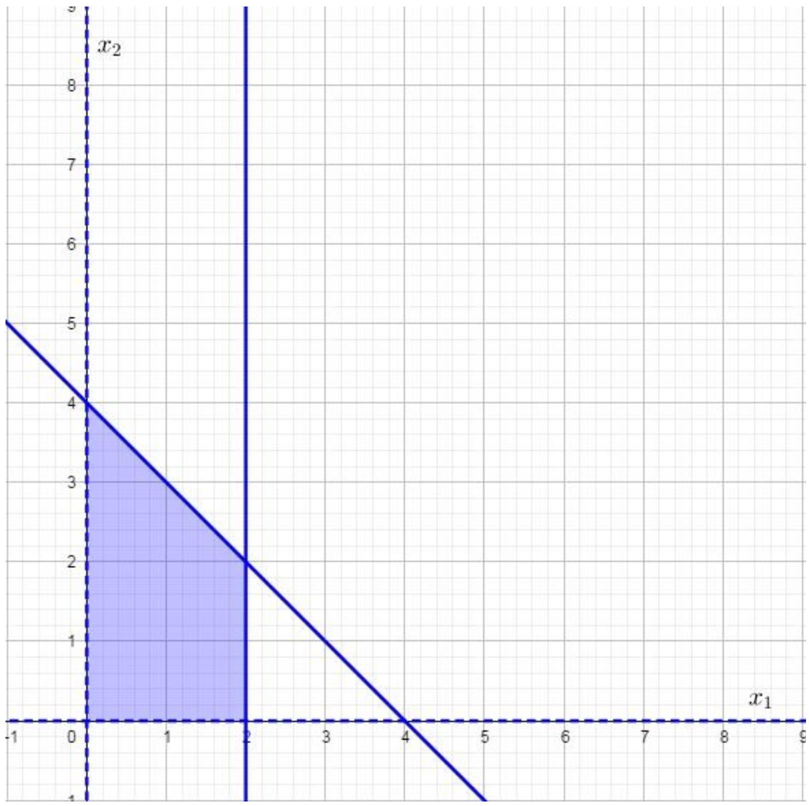


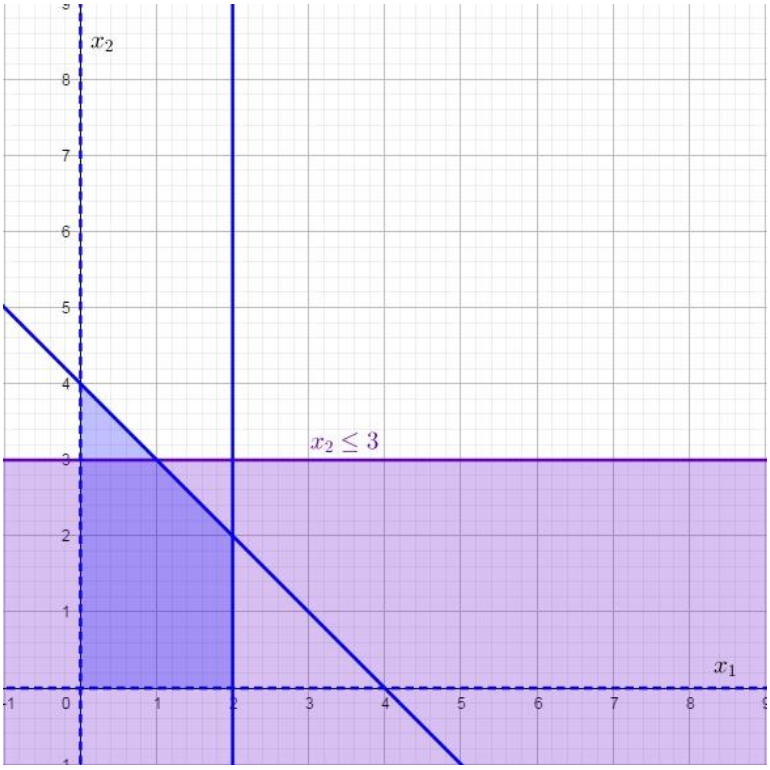
Then we can insert the others constraints and remove the regions where our problem is not feasible:

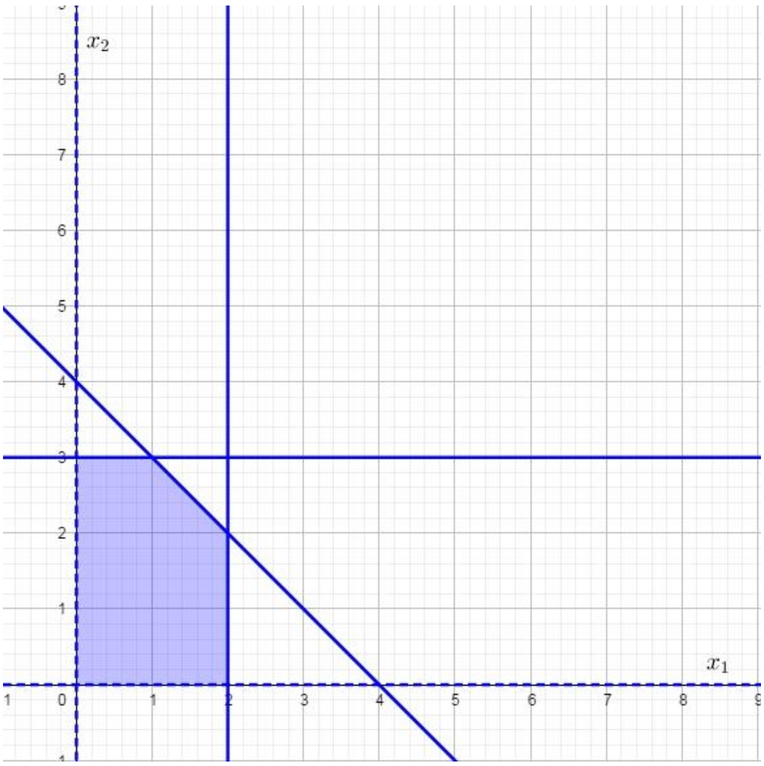




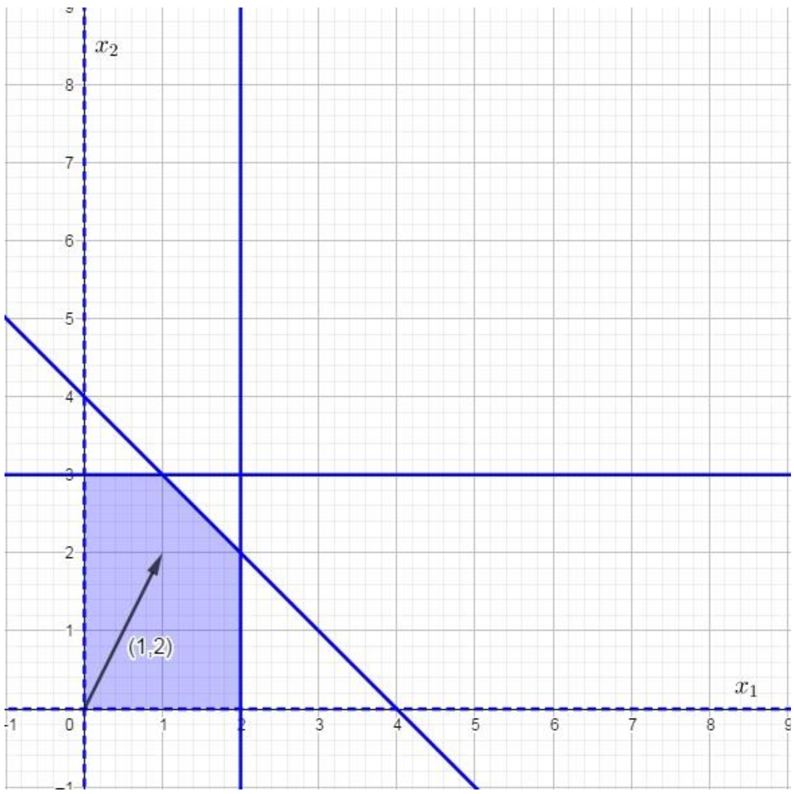

x_2
$x_1 \leq 2$
x_1

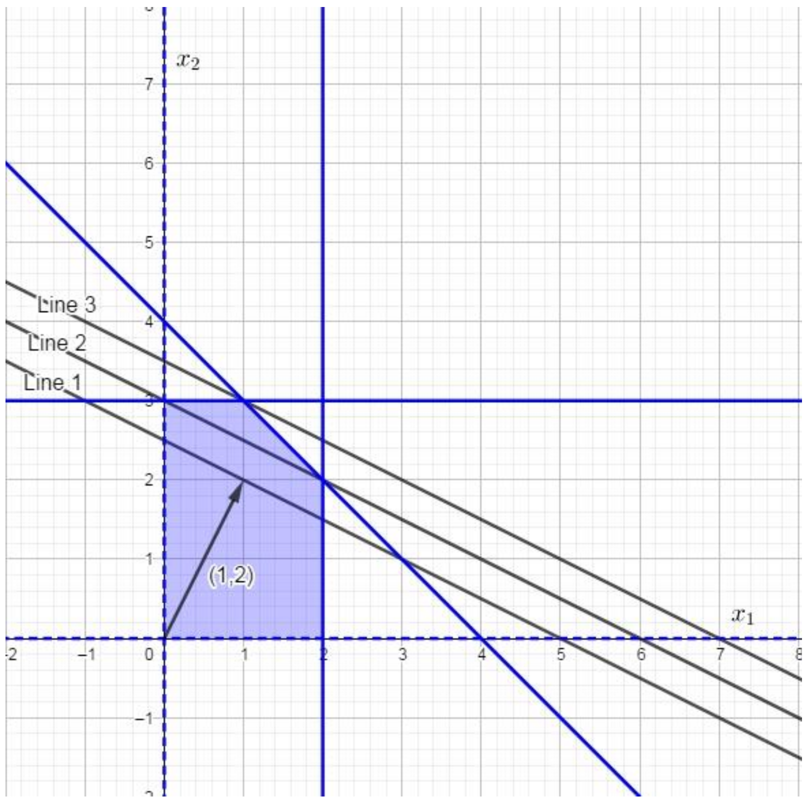

x_2
x_1





At the end, this is our feasible region, but now we need to find the optimal value inside this region, a way to find it is calculating the gradient of the objective function. Since the gradient points to the region where our function has the maximum rate of change, we just need to draw lines that are perpendicular to our gradient vector.





Our third line intercept the last point of our feasible region (1, 3) and this is our best answer to maximize our function given the constraints. Therefore, our result is:

$$x_1 = 1, x_2 = 3 \ and \ f(x_1, x_2) = 7$$