Data Structures and Algorithms Homework 14

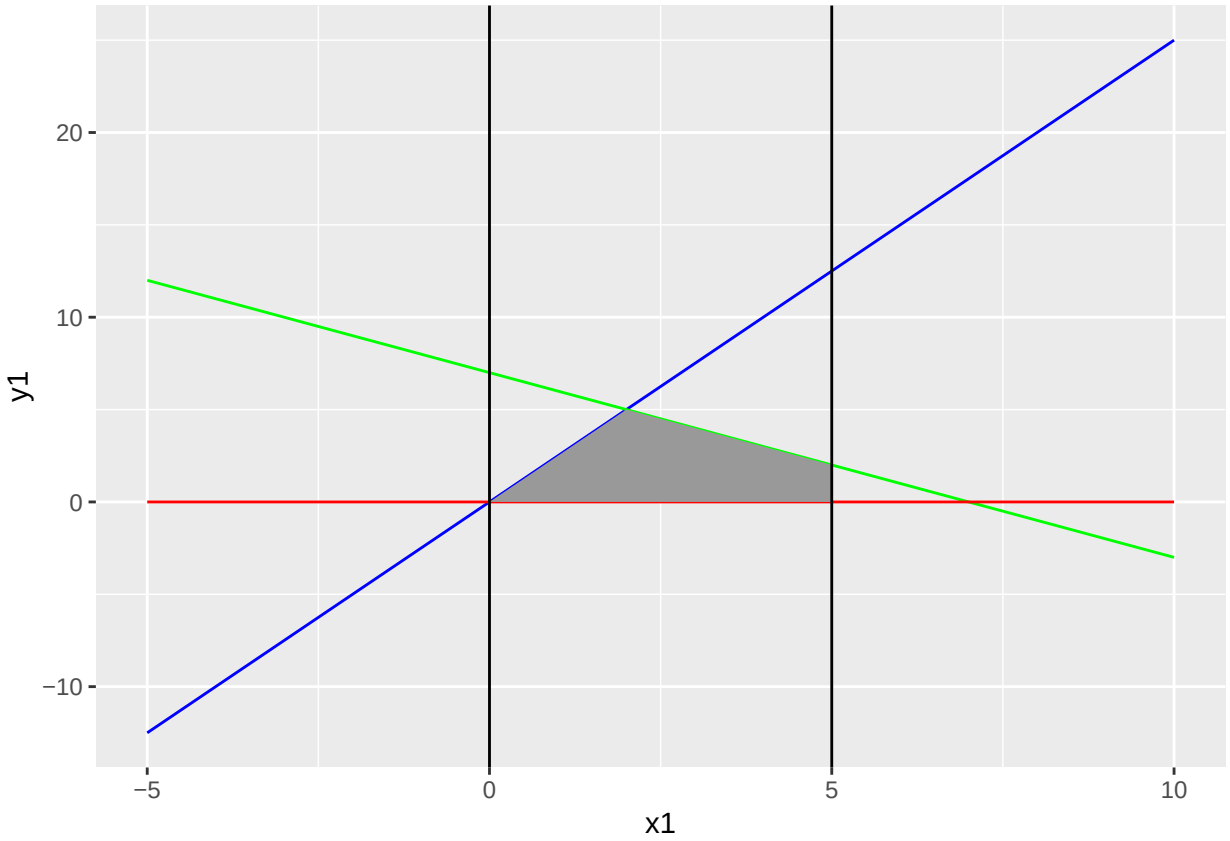
Due Wednesday Dec 11; Joseph Sepich (jps6444)

1 Problem 1

1.1 Part a

1.2 Part b

2 Problem 2 Linear Program



Maximizing the function 5x + 3y, the (5,0) vertex gives a value of 25. Going up the vertical line to the next vertex (5, 2) the value is 31. This value is clearly higher. Going to the interecting vertex (2, 5) the value is 25. Our highest value vertex is (5, 2) with 31. If we go towards the top vertex with (4, 3) we get 29, which is less, and if we go towards the axis vertex with (5, 1) we get 28, which is less. Therefore our optimal solution is 31 with x = 5 and y = 2.

3 Problem 3

The equation for our dual is as follows:

$$(j+k)x + (j+k)y \leq j*3 + k*5$$

So our dual LP would be:

$$\min(3j+5k)$$
$$j+k \geq 1$$
$$j,k \geq 0$$

The minimization of this dual is clearly just j=1 to get a value of 3. If you plug this into the primal LP, an upper bound of the problem is 3. 3 could be obtained by x = 1 and y = 2, which would be the optimal solution, since both the primal and dual LP have the same value. Again this solution would be:

- j = 1
- k = 0
- x = 1
- y = 2
- value = 3

4 Problem 4

5 Probelm 5

5.1 Part 1

5.2 Part 2