

Maximize $P = 20x_1 + 10x_2 + 15x_3$

Subject to:

$$\begin{array}{rcccccl} 3x_1 & + & 2x_2 & + & 5x_3 & \leq & 55 \\ 2x_1 & + & x_2 & + & x_3 & \leq & 26 \\ x_1 & + & x_2 & + & 3x_3 & \leq & 30 \\ 5x_1 & + & 2x_2 & + & 4x_3 & \leq & 57 \\ x_1 & & & & & \geq & 0 \\ & & x_2 & & & \geq & 0 \\ & & & & x_3 & \geq & 0 \end{array}$$

Please work in groups to find the solution to the following problems.

1. Find the vector c for the objective function.
2. Find the matrix A for the constraint set.
3. Find the vector b for the constraint bounds.
4. Find all "corners" of the set. Use your favorite program to do so. Remember three equations and three unknowns will help you find some of these corners. You may need to use MATLAB or R or Python to solve the equation. $x = A^{-1}b$ is the solution for $Ax = b$. Note that there are $\binom{7}{3}$ equations. Work as a group and divide and conquer these.
5. Test all of the corners against the objective function and report the corner and its value in a table. For example (0,0,0) is a corner and 0 is the objective function. Make a table of these.
6. Is this a computationally efficient way of finding the solution?
7. Be sure to put all of your names on the document so I can give you all credit... which might be extra credit!