

Math 484 Quiz 05 Graphical Pivoting (To be done in Mathematica)

$$\text{Min } z = -2x - 4y + 4$$

$$g1(x,y) = 4x + 3y \leq 48$$

$$g2(x,y) = 4x + 3y \geq 24$$

$$g3(x,y) = -3x + y \leq 6$$

$$g4(x,y) = 3x - y \leq 6$$

1. Define the objective and all constraint functions, and define each slack variable as a function $s_i[x,y] = g_i[x,y] - b_i$ or $s_i = b_i - g_i[x,y]$ as required by each inequality constraint.
2. Plot the feasible constraint boundaries and shade the feasible region.
3. Put the LP in a tableau called “a” and then pivot successively to produce tableaux b,c,d,...,l that map to the labeled intersections in the graph. Regardless of whether the feasible region is in the first quadrant, use x_1, \dots, x_4 as control variables where the original variable $x = x_1 - x_2$ and $y = x_3 - x_4$.
4. For each tableau, extract the basic solution; i.e., define symbols $x_1, \dots, x_4, s_1, \dots, s_4$, and z as dictated by the basic solution of the tableau. Then assign $x = x_1 - x_2$ and $y = x_3 - x_4$. Then use boolean comparisons to verify $s_i == s_i[x,y]$, where s_i is assigned directly from the tableau and $s_i[x,y]$ uses the function defined in (1) and x,y values derived directly from the tableau. Similarly, verify that $z == z[x,y]$.
5. Upload your Mathematica file to the dropbox on Canvas. Name your file “LP QZ 05 Sec k Given_Name Family_Name” where $k = 1, 2, 3$, or 4. (I refer to Given_Name and Family_Name because “First_Name” and “Last_Name” are not consistently defined across cultures.)

