Solutions to Attendance Quiz for Lecture 5

1. (a) Sketch the set of feasible solutions to the given linear programming problem (b) Draw the indicated objective function $z = \mathbf{c}^T\mathbf{x} = k$, for the indiated values of k and (c) conjecture the optimal value of z.

Maximize $z = 2x + y$ subject to the constraints

$$x + 3y \leq 12 \quad , \quad 3x + y \leq 12 \quad , \quad x + y \geq 5 \quad , \quad x \geq 0 \quad , \quad y \geq 0 \quad ,$$

$$k = 6, 9, 12 \quad .$$

Solution #1

The line $2x + y = 9$ intersects the feasible region at the vertex $(3, 3)$ (the intersection of the lines $x + 3y = 12$ and $3x + y = 12$, but any line of the form $2x + y = k$ for $k > 9$ does not, hence the **optimal value** of z is 9.