Mary's lemonade and sorbet stand: Mary owns a lemonade and sorbet stand. She can make one quart of lemonade from three lemons and 6 tablespoons of sugar. To make one quart of sorbet, she uses seven lemons and nine tablespoons of sugar. She takes 5 minutes to make a quart of lemonade and 20 minutes to make a quart of sorbet. She can sell a quart of lemonade for \$5 and a quart of sorbet for \$9.

How much lemonade and sorbet should Mary make to maximize revenue?

We described the following *linear program* in class:[1]

Decision variables:

$$\begin{aligned} L &= \text{quarts of lemonade made} \\ S &= \text{quarts of sorbet made} \end{aligned}$$

Objective function:

$$f(L, S) = 5L + 9S.$$

Constraints:

$$\begin{array}{lll} 3L + 7S & \leq 100 & \text{lemon constraint} \\ 6L + 9S & \leq 150 & \text{sugar constraint} \\ 5L + 20S & \leq 480 & \text{time constraint} \\ L, S \geq 0 & & \text{nonnegativity} \end{array}$$

[1] Note that the variable names used are not necessarily the same as what we did in class.