

Lesson 14. Production Process Models, Revisited

Example 1. Yobro Co. produces three types of high-end organic, bio-diverse, fair-trade, non-harmful-to-animals household cleaners: standard, pine, and lemon. Each gallon of raw soap produces a_s gallons of standard, a_p gallons of pine, and a_ℓ gallons of lemon. Each gallon of standard can be converted directly into b_{sp} gallons of pine at a cost of c_{sp} per gallon. Separately, each gallon of standard can also be converted into $b_{s\ell}$ gallons of lemon at a cost of $c_{s\ell}$ per gallon. Raw soap costs c_r per gallon. Standard, pine, and lemon sell for v_s , v_p , and v_ℓ per gallon, respectively. Suppose that Yobro wants to satisfy demand for d_s gallons of standard, d_p of pine, and d_ℓ gallons of lemon.

- a. Write a linear program that determines the number of gallons of each type of cleaner Yobro should make in order to maximize profit. Make sure to
 - define the input parameters,
 - define the decision variables, and
 - briefly explain the objective function and constraints that you write.

- b. YoBro just tweeted that they have created an additional process that converts standard to pine and lemon simultaneously. With this process, each gallon of standard converts to f_{sp} gallons of pine and f_{sl} gallons of lemon at a cost of c_{spl} per gallon. How do you change the linear program you just wrote to account for this new process?