

Answer on Question #56226 – Math – Other

(a) Long Castling Breweries manufactures two brands of beer, Benko lager and Benoni lager. Benko has a contribution of Sh.4 per unit and Benoni has a contribution of Sh.3 per unit. Benko requires 30 machine minutes and 30 labor minutes to manufacture a unit whereas a unit of Benoni requires 20 machine minutes and 30 labor minutes to manufacture. Total available machine hours per day are 12hrs whereas total available labour hours per day are 14hrs.

Required:

- i) Formulate linear programming model
- ii) How much of each brand should Long Castling produce if it wishes to maximize its daily contribution assuming that all the lager produced is sold

Solution

i. Let x be a number of Benko, y be a number of Benoni

So linear programming model:

Objective function: $f(x, y) = 4x + 3y$

Constraints:

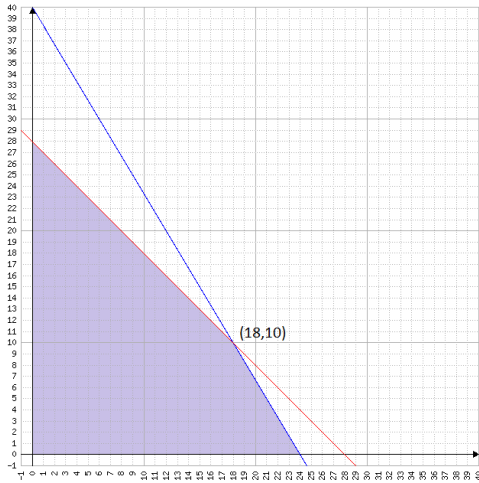
$$x \geq 0,$$

$$y \geq 0,$$

$$0.5x + 0.3y \leq 12,$$

$$0.5x + 0.5y \leq 14.$$

ii.



Search for the intersection of two graphs of functions

$$0.5x + 0.3y = 12,$$

$$0.5x + 0.5y = 14.$$

Subtract the first equation from the second one:

$$0.5y - 0.3y = 14 - 12, \text{ which is equivalent to } 0.2y = 2, \text{ hence } y = 10.$$

Plug $y = 10$ in the first equation :

$$0.5x + 0.3 \cdot 10 = 12,$$

which is equivalent to

$$0.5x = 12 - 3,$$

hence

$$x = \frac{9}{0.5} = 18.$$

Evaluate

$$f(0, 29) = 3 * 29 = 87;$$

$$f(18, 10) = 4 * 18 + 3 * 10 = 102;$$

$$f(24, 0) = 4 * 24 = 96;$$

$$\text{Thus } f_{max} = f(18, 10) = \text{Sh. } 102$$

Long Castling should produce 18 Benco and 10 Benoni.