Pre-Calculus and Calculus

Nathan Alspaugh

December 6, 2024

Contents

1 Lineal Programming

Notes about Lineal Programming!

1.1 What is it?

Lineal programming is a way to find the best outcome (maximum or minimum) represented by linear relationships.

1.2 Example Problems

Problem 1 *A factory has 2 products A and B. The profit for each product is $20 and $30 respectively. The factory has 2 machines, machine 1 and machine 2. Machine 1 has a maximum time of production of 800 hours and Machine 2 has a maximum production time of 600 hours. Product A needs 2 hours in Machine 1 and 1 hour in Machine 2. Product B requires 1 hour in Machine 1 and 3 hours in Machine 2. How many products of each type should be produced to maximize the profit?*

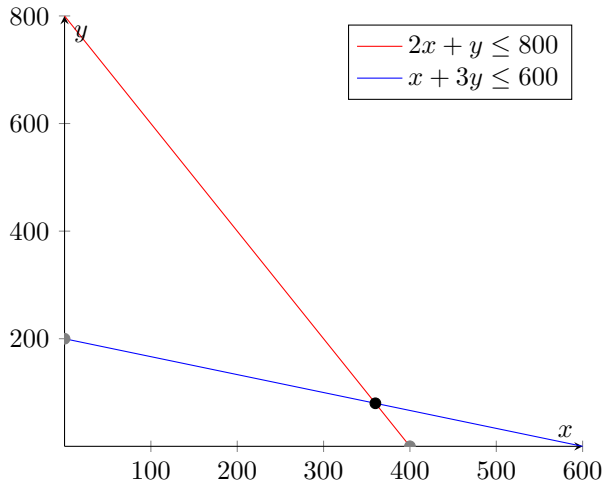
$$\begin{aligned} &\textit{Maximize } 20A + 30B \\ &\textit{Subject to } 2A + B \leq 800 \\ &\qquad\qquad A + 3B \leq 600 \\ &\qquad\qquad A, B \geq 0 \end{aligned} \tag{1}$$

$$\begin{aligned} &\textit{The function } F(A, B) = 20A + 30B \\ &\textit{Can be represented as } F(x, y) = 20x + 30y \end{aligned} \tag{2}$$

	A	*B*	*Max*
Machine 1	*2*	*1*	*800h*
Machine 2	*1*	*3*	*600h*
Price	*$20*	*$30*	

(3)

F(x, y)



(4)

x	y	*F(x, y)*
0	*200*	*6000*
400	*0*	*8000*
360	*80*	*9600*

(5)

Using the function $F(A, B) = 20A + 30B$

$$\begin{aligned} F(x, y) &= 20x + 30y \\ F(360, 80) &= 20(360) + 30(80) \\ F(360, 80) &= 9600 \end{aligned} \tag{6}$$

The maximum of the function is at the point $(360, 80)$ (7)