Sec. 3.4 Linear Programming

Vocabulary

- linear programming: a method for finding a minimum or maximum value of some quantity, given a set of constraints
- constraint: a limit
- feasible region: graph of the system of constraints
- objective function: model of the quantity you are trying to maximize or minimize

Problem 1:

Summer movie plans

- movie at night costs $8
- matinee costs $5

Constraints:
- you want to go to at least as many night shows as matinees
- you want to spend at most $42.

O.F.: What is the greatest number of movies you can see?

① Define the variables: x = # of night movies, y = # of matinees

"Real world" constraints:
$x \geq 0$
$y \geq 0$

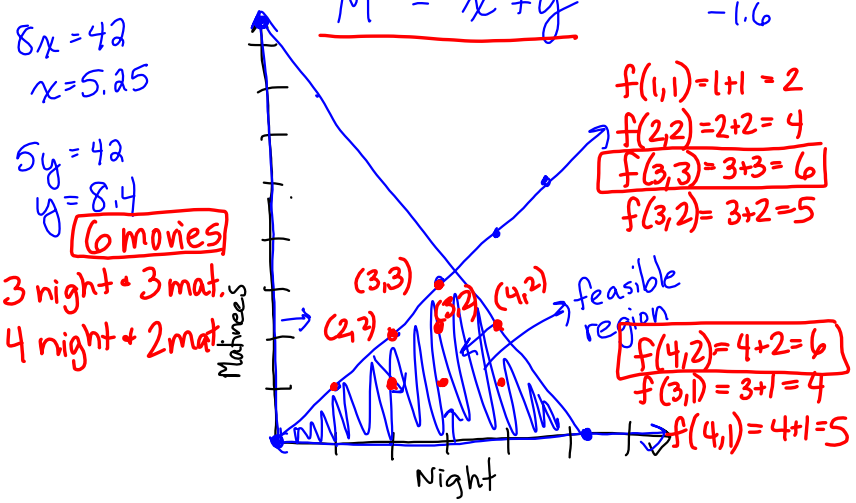
Constraints graph:
$x \geq y \rightarrow \boxed{y \leq x}$ $m=1$, $b=0$
$8x + 5y \leq 42$ $\frac{5y}{5} \leq \frac{-8x}{5} + \frac{42}{5}$
$\boxed{y \leq -\frac{8}{5}x + 8.4}$ -1.6

O.F.: $f(x,y) = x + y$
$M = x + y$

$8x = 42$
$x = 5.25$

$5y = 42$
$y = 8.4$

6 movies
3 night + 3 mat.
4 night + 2 mat.



Sec. 3.5 Systems With Three Variables

Problem 1: Solve using elimination

① $3x + y - z = 1$ → ① $3x + y - z = 1$ ①+②

② $x + 2y + z = 4$ → ② $x + 2y + z = 4$

③ $3x - y - z = 3$

④ $4x + 3y = 5$

1,2 } Elimate the same variable twice
1,3 }
2,3 }

② $x + 2y + z = 4$
③ $3x - y - z = 3$

⑤ $4x + y = 7$

④ $4x + 3y = 5$ → $4x + 3y = 5$
⑤ $4x + y = 7$ $\xrightarrow{\times -1}$ $-4x - y = -7$

$\frac{2y}{2} = \frac{-2}{2}$

$y = -1$

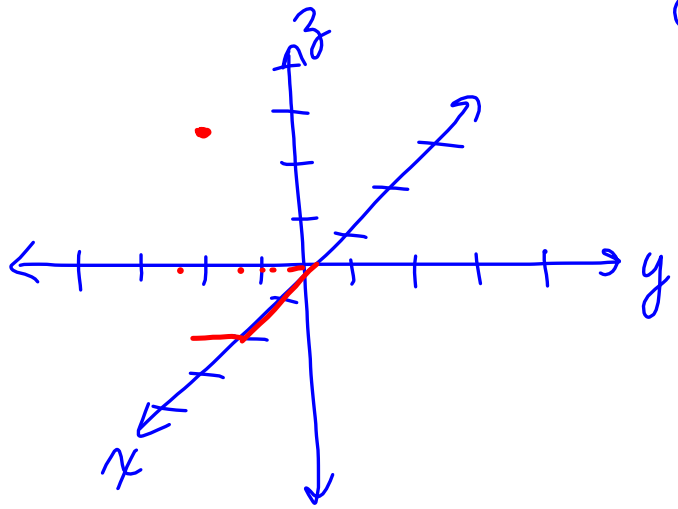
$4x + 1 = 7$
$-1 \quad -1$

$\frac{4x}{4} = \frac{8}{4}$

$x = 2$

(x, y, z)

$(2, -1, 4)$



③ $3(2) - (-1) - z = 3$

$6 + 1 - z = 3$

$7 - z = 3$

$-7 \quad -7$

$-z = -4$

$z = 4$