$-3y + 2x \geq 6$

boundary line:

$-3y + 2x = 6$

x-int

$-3(0) + 2x = 6$

$2x = 6$

$x = 3$

$(3,0)$

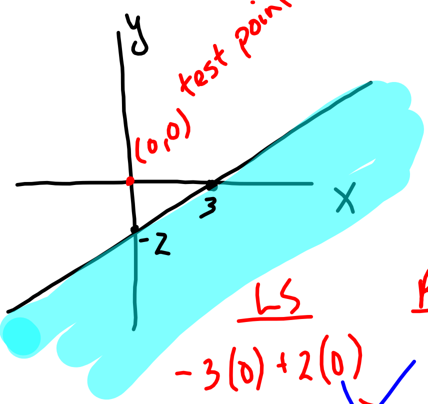
y-int

$-3y + 2(0) = 6$

$-3y = 6$

$y = -2$

$(0,-2)$



LS	RS
$-3(0) + 2(0)$	6
0 $\cancel{\geq}$ 6	

$-3y + 2x \geq 6$

rearrange into $y = mx + b$ form:

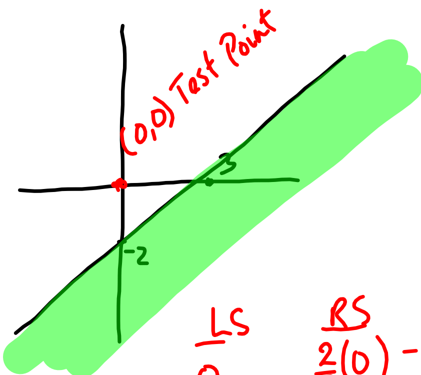
$-3y \geq 6 - 2x$

When multiplying or dividing by a neg. #, the inequality reverses.

$y \leq -2 + \frac{2}{3}x$

$y \leq \frac{2}{3}x - 2$

boundary line: $y = \frac{2}{3}x - 2$



LS	RS
0	$\frac{2}{3}(0) - 2$
0 $\cancel{\leq}$	-2

Sections 6.4, 6.5, and 6.6: Optimization Problems (Linear Programming)

Steps:

1. Identify what is to be optimized
2. Define Variables
3. Write the system of inequalities
4. Write the objective function (an equation)
5. Identify the constraints and restrictions
6. Graph the system to find feasible region
7. Identify the vertices of the feasible region
8. Find the optimal solution + verify that it satisfies the constraints.

INVESTIGATE the Math

p332

A toy company manufactures two types of toy vehicles: racing cars and sport-utility vehicles.

- Because the supply of materials is limited, no more than 40 racing cars and 60 sport-utility vehicles can be made each day.
- However, the company can make 70 or more vehicles, in total, each day.
- It costs \$8 to make a racing car and \$12 to make a sport-utility vehicle.

There are many possible combinations of racing cars and sport-utility vehicles that could be made. The company wants to know what combinations will result in the minimum and maximum costs, and what those costs will be.

Steps:

1. Identify what is to be optimized Cost (minimum and maximum)

2. Define Variables
   let r be the # of racing cars
   s be the # of SUVs

3. Write the system of inequalities
   $r \leq 40$ $r + s \geq 70$
   $s \leq 60$

4. Write the objective function (an equation for the quantity to be optimized)
   $\text{Cost} = 8r + 12s$

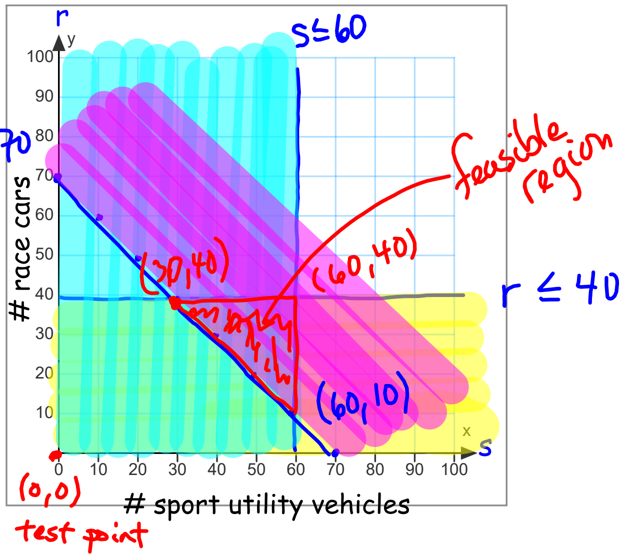
Objective function: $C = 12s + 8r$

5. Identify the constraints and restrictions

Constraints
$r \leq 40$
$s \leq 60$
$r + s \geq 70$

restriction
$r \in W$
$s \in W$
stipple if practice

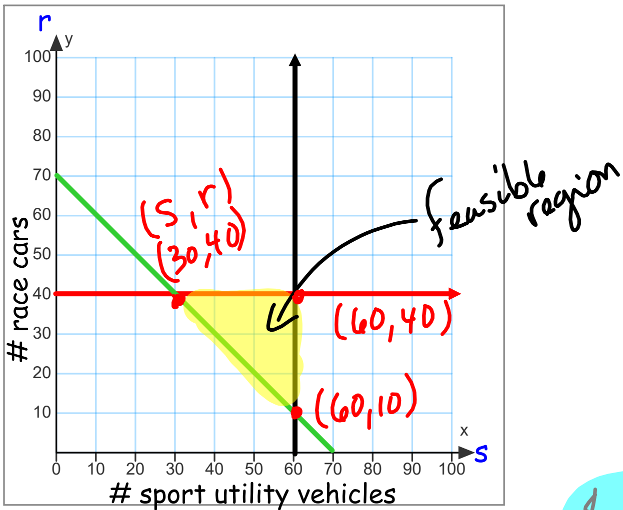
6. Graph the system to find feasible region (s, r)



Objective function: $C = 12s + 8r$

7. Identify the vertices of the feasible region

(s, r) (60,40)
(30,40) (60,10)



8. Find the optimal solution

Sub into our objective function

(s, r) = (30,40)

$C = 12s + 8r$

$C = 12(30) + 8(40)$

$C = 360 + 320$

$\boxed{C = \$680}$

Minimum cost
30 SUVs and 40 racing cars

(s, r) = (60,40) $C = 12(60) + 8(40) = 720 + 320 = \$1040$

(60,10) $C = 12(60) + 8(10) = 720 + 80 = \$800$

Maximum cost
60 SUVs and 40 racing cars

ALWAYS check your solutions to see if they satisfy the constraints/restrictions.

p327

A refinery produces oil and gas.

- At least 2 L of gasoline is produced for each litre of heating oil.
- The refinery can produce up to 9 million litres of heating oil and 6 million litres of gasoline each day.

constraints.

- Gasoline is projected to sell for \$1.10 per litre. Heating oil is projected to sell for \$1.75 per litre.

← objective function

The company needs to determine the daily combination of gas and heating oil that must be produced to maximize revenue. Create a model to represent this situation.

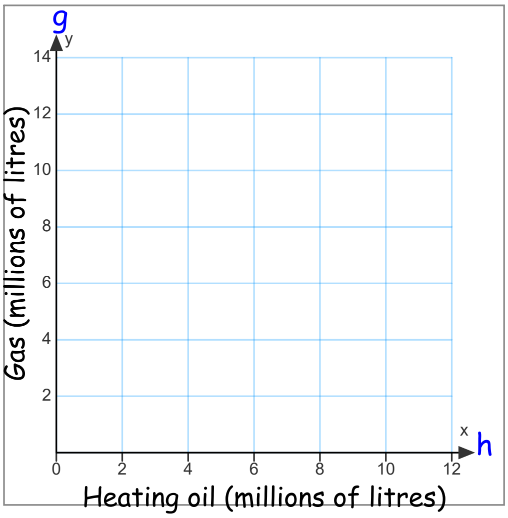
Steps:

1. Identify what is to be optimized
2. Define Variables
3. Write the system of inequalities
4. Write the objective function

Objective function: $R = 1.10g + 1.75h$

5. Identify the constraints and restrictions

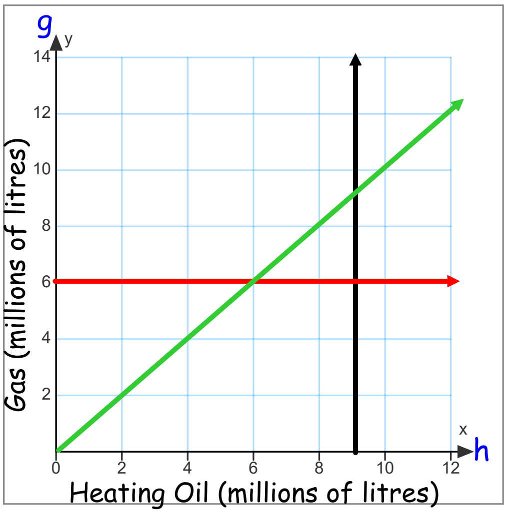
6. Graph the system to find feasible region



Objective function: $R = 1.10g+1.75h$

7. Identify the vertices of the feasible region

8. Find the optimal solution



TO DO: ① Look over p 329

② C4U p330 (#1 and #2)

A vending machine sells juice and pop. The machine holds at most 240 cans of drink. Sales from the vending machine show that at least 2 cans of juice are sold for each can of pop. Each can of juice sells for $1.00 and each can of pop sells for $1.25. Determine the maximum revenue from the vending machine.

p330 #3

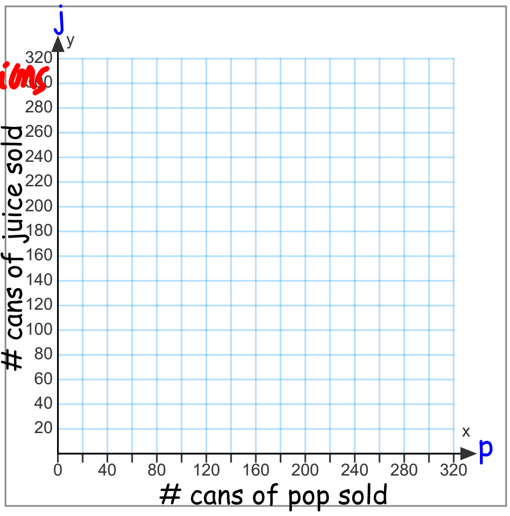
Steps:

1. Identify what is to be optimized
2. Define Variables
3. Write the system of inequalities
4. Write the objective function

Objective function: $R = 1.25p + j$

5. Identify the constraints + restrictions

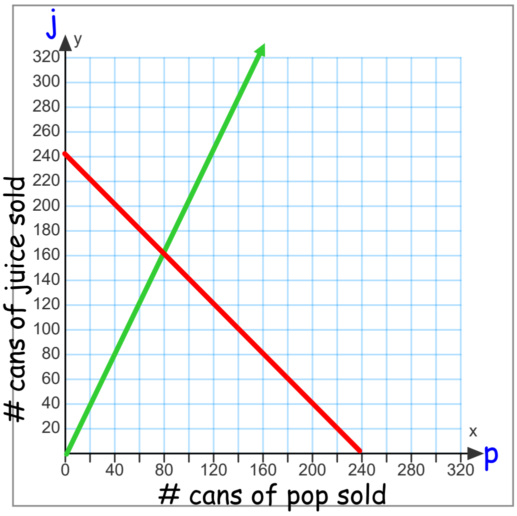
6. Graph the system to find feasible region



Objective function: $R = 1.25p + j$

7. Identify the vertices of the feasible region

8. Find the optimal solution



On a flight between Winnipeg and Vancouver, there are business class and economy seats. At capacity, the airplane can hold no more than 145 passengers. No fewer than 130 economy seats are sold and no more than 8 business class seats are sold. The airline charges $615 for business class seats and $245 for economy seats. What combination of business class and economy seats will result in maximum revenue? What will the maximum revenue be?

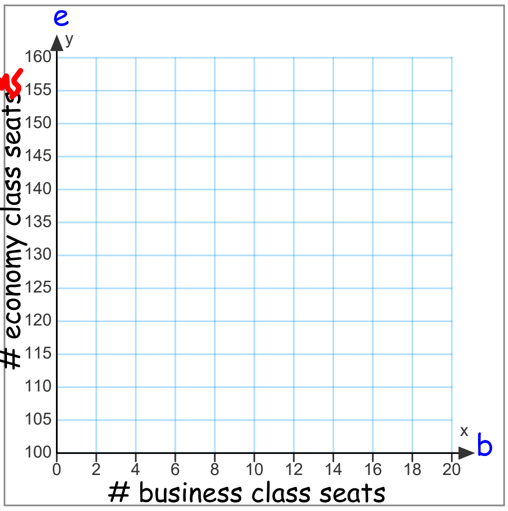
p345 #11

Steps:

1. Identify what is to be optimized
2. Define Variables
3. Write the system of inequalities
4. Write the objective function

Objective function: R = 615b + 245e

5. Identify the constraints + restrictions

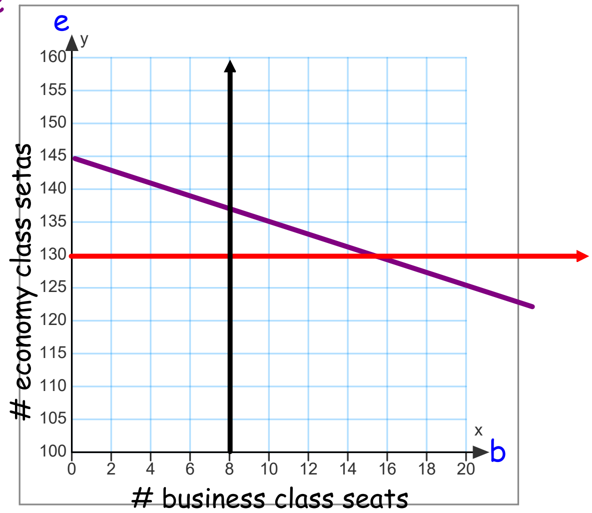


6. Graph the system to find feasible region

Objective function: $R = 615b + 245e$

7. Identify the vertices of the feasible region

8. Find the optimal solution



TODO: p331 | 5, 6, 7
p334-335 | 2 + 3
p345 | 12, 13, 14

Practice:

p. 331, Q. 5, 6, 7

p. 334, Q. 2

p. 335, Q. 3

p. 345, Q. 12, 13, 14