Finding a maximum & a minimum for a problem

Optimization: Part 1 Name: _____

Foundations 11 Block: ___ Date: _____

Ex.

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.

a) Assign variable and determine restrictions

Let x = Race cars

y = SUVs

Objective function:

$C = 8x + 12y$

b) Write inequalities

$x + y \geq 70$

$x \leq 40$

$y \leq 60$

$x \in W$

$y \in W$

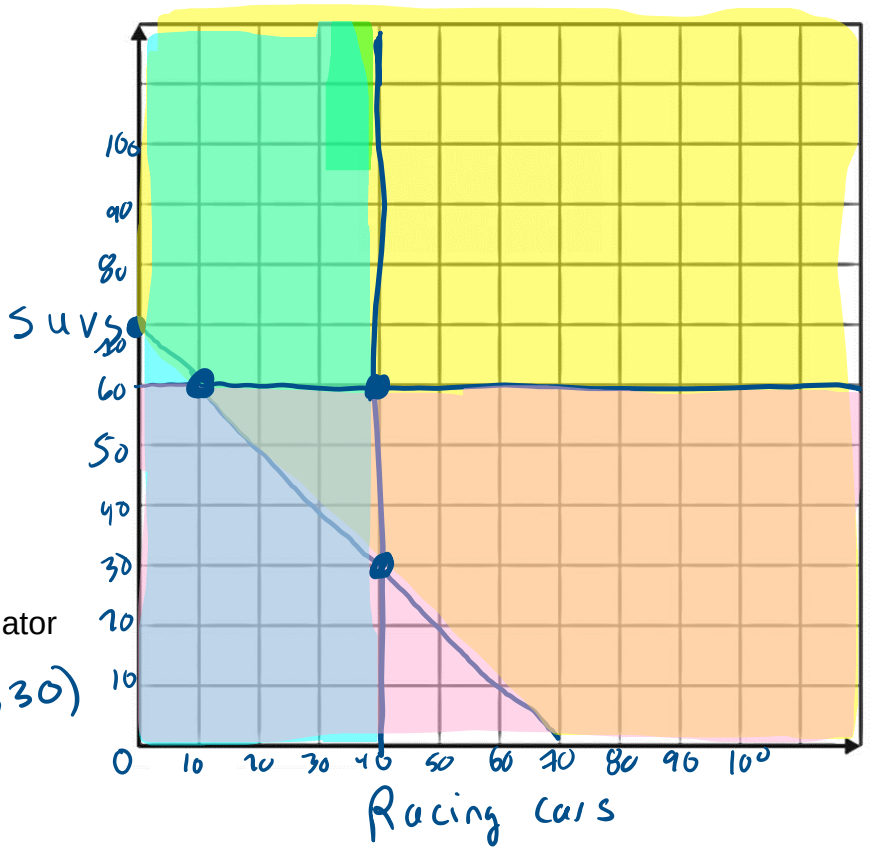
c) Rearrange for calculator

$x + y \geq 70$

$-x \quad -x$

$y \geq -x + 70$

d) Graph



e) Find intersection points using calculator

(10,60) (40,60) (40,30)

f) Test points for min and max

$C = 8x + 12y$

(10,60)

$C = 8(10) + 12(60)$

$= 80 + 720$

$= \$800$

(40,60)

$C = 8(40) + 12(60)$

$= 320 + 720$

$= \$1040$

MAX

(40,30)

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

$= 320 + 360$

$= 680$

MIN