

# OPTIMIZATION PROBLEM 1

OPTIMIZATION - TO MINIMIZE / MAXIMIZE A

QUANTITY .

DE MAXIMIZE

- PROFIT

MINIMIZE

- COST

- PRODUCTION

- EMPLOYEES / MATERIAL / TIME

- WHEN MODELS IN AN OPTIMIZATION PROBLEM WE

WRITE A LIST OF INEQUALITIES REPRESENTING

CONSTRAINTS OF THE PROBLEM, SUCH AS LIMITS

ON TIME, MONEY, MATERIAL AND REQUIREMENT

MEASUREMENTS SUCH AS PRODUCE, PROFIT ETC.

- WE WILL NEED AN OBJECTIVE FUNCTION (EQUATION).

DE A BAKERY PRODUCES CAKES AND DOUGHNUTS.

DOUGHNUTS SELL AT LEAST TWICE AS MANY CAKES,

1000 DOUGHNUTS AND 55 CAKES CAN BE PRODUCED

DAILY. CAKES SELL FOR  $30^{\text{¢}}$ , DOUGHNUTS  $75^{\text{¢}}$

CREATE A MODEL + GRAPH

SOLN GOAL - MAXIMIZE SALES

LET  $x$  = THE NUMBER OF CAKES

$y$  = THE NUMBER OF DOUGHNUTS

CONSTRAINTS

$$x \geq 0, x \in W$$

$$y \geq 0, y \in W$$

①

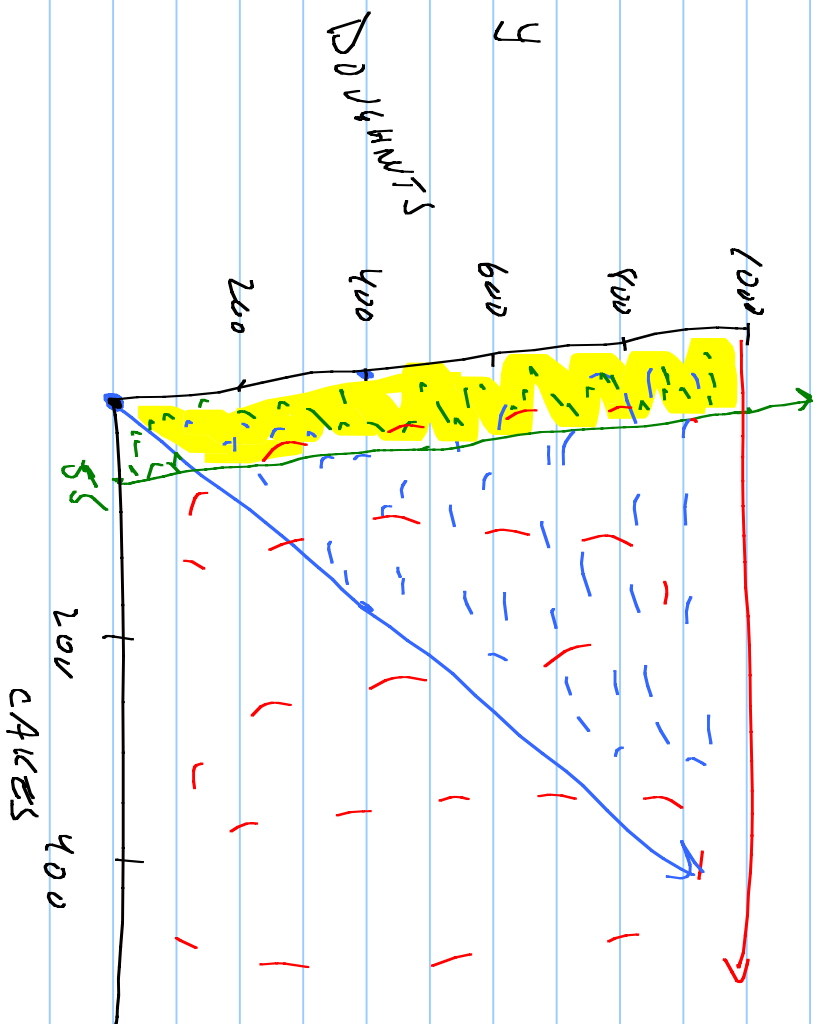
$$y \geq 2x$$

$$x \leq 55$$

$$y \leq 1000$$

OBJECTIVE FUNCTION

$$S = 300x + .75y$$



THE REGION OF OVERLAP IS CALLED THE

## FEASIBLE REGION

THE YOU ARE BALANCING COOKIES WITH M+M'S AND

CHOC. CHERR. M+M'S COST 4¢ AND CHOCOLATE

CHERR. COST 2¢ EACH. EACH COOKIE MUST HAVE

AT LEAST 4 M+M'S AND 6 CHOC. CHERR. YOU

BUDGET ALLOW FOR NO MORE THAN 40¢ OF CANDY

PER COOKIE. MODEL THE SITUATION

SOLN    SMALL - MINIMIZING COST

Let  $x = \#$  of MP's     $x \geq 0$ ,  $x \in \mathbb{N}$

$y = \#$  of ATOC. CHIPS     $y \geq 0$ ,  $y \in \mathbb{N}$

CONSTRAINTS

①  $x \geq 4$

②  $y \geq 6$

③  $4x + 2y \leq 40$      $\Leftrightarrow$

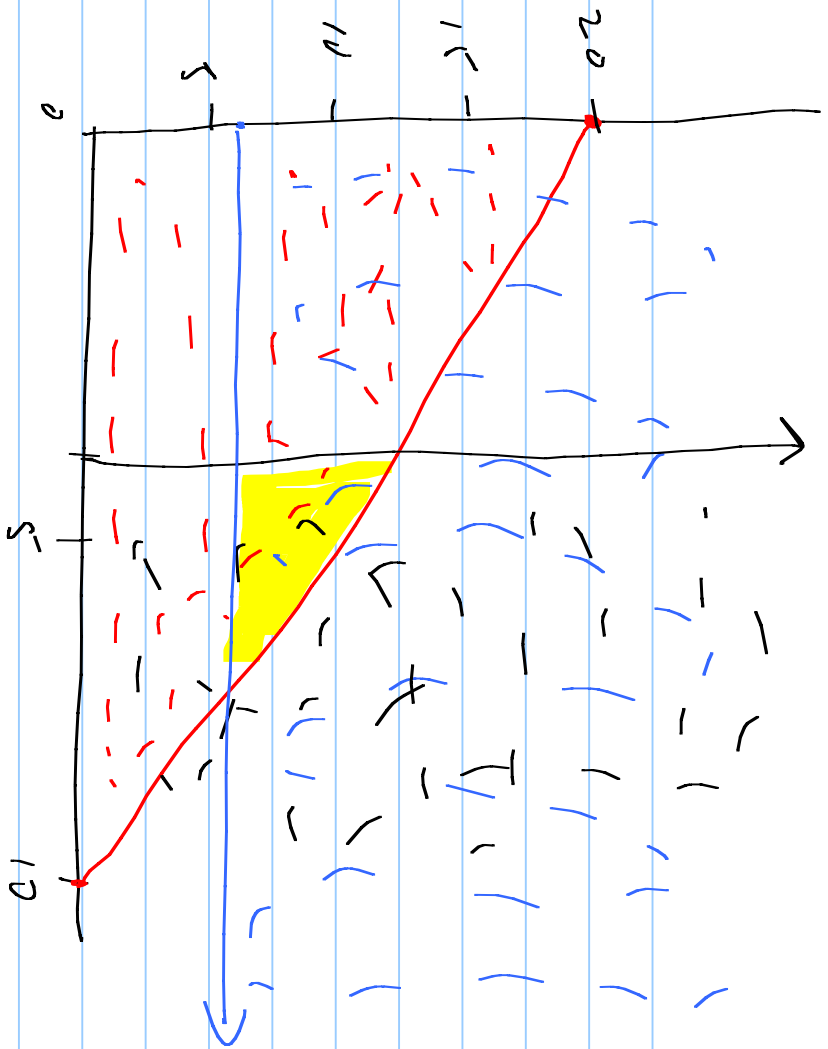
$\hookrightarrow \frac{4x + 2y = 40}{-4x} \quad -4x$   
 $2y = 40$

$\frac{2y}{2} = \frac{-4x + 40}{2}$

$y = -2x + 20$

OBJECTIVE FUNCTION

$C = x + y$



H/w Pg 330

# 1-4