

Problem 1

- a. Define the decision variables

X = Collegiate Units

Y = Mini Units

- b. What is the objective function

$$\text{MAX } 32X + 24Y$$

- c. What are the constraints

$$0 \leq X \leq 1000$$

$$0 \leq Y \leq 1200$$

$$3X + 2Y \leq 5000$$

$$45X + 40Y \leq 84,000$$

- d. What down the full math formula for this LP problem

$$\text{MAX } 32X + 24Y = \text{Profit}$$

$$\text{MIN } 45X + 40Y = \text{Labor Cost}$$

Work:

	Collegiate	Mini	
sq ft required	3	2	
labor (mins)	45	40	
profit	32	24	
5000	sq ft of material per week		
Units sold of Collegiate per wk ≤ 1000			
Units sold of Mini per wk ≤ 1200			
35 employees, 40 hrs per week			

Problem 2

- a. Decision variables for plants 1, 2 & 3

S = units of the small product

M = units of the medium product

L = units of the large product

- b. Linear Programming model

MAX $300S + 360M + 420L$ = profit

Constraints:

$S, M, L \geq 0$

Plant	Production Capacity	Storage Capacity	Avoid Layoffs (needs above .5 "50%")
1	$S + M + L \leq 750$	$12S + 15M + 20L \leq 13000$	$(S + M + L) / 540 > .5$
2	$S + M + L \leq 900$	$12S + 15M + 20L \leq 12000$	$(S + M + L) / 900 > .5$
3	$S + M + L \leq 450$	$12S + 15M + 20L \leq 5000$	$(S + M + L) / 450 > .5$

Work:

	small	medium	large
profit	300	360	420
storage	12	15	20
	excess cap to product / day	Storage space limit	
Plant 1	540	13000	
Plant 2	900	12000	
Plant 3	450	5000	
Each plant must use greater than 50% of their production capacity to avoid layoffs. The percentage should be the same for each plant.			