

OPTIMIZATION QUESTIONS FROM JUNE 8th TUTORIAL:

TOPIC 1: OPTIMIZATION

$$C = 3500x + 1500y$$

The city council of a town wants to minimize the cost of staffing its recreation centres in the summer months. The council has determined that supervisors will be paid \$3500 for the summer and staff workers will be paid \$1500 for the summer.

The council wants to hire its employees using the following constraints:

- The maximum number of employees for its centres is 30 and the minimum is 18. $x + y \leq 30$ $x + y \geq 18$
- The council also wants to hire at least 6 supervisors but no more than 14 supervisors. $x \geq 6$ $x \leq 14$
- It wants to hire at least 8 staff workers. $y \geq 8$
- The number of staff workers must be at most twice the number of supervisors. $y \leq 2x$

How many staff workers and how many supervisors can the town council hire and minimize its costs?

Show all your work.

x : number of supervisors
 y : number of staff workers

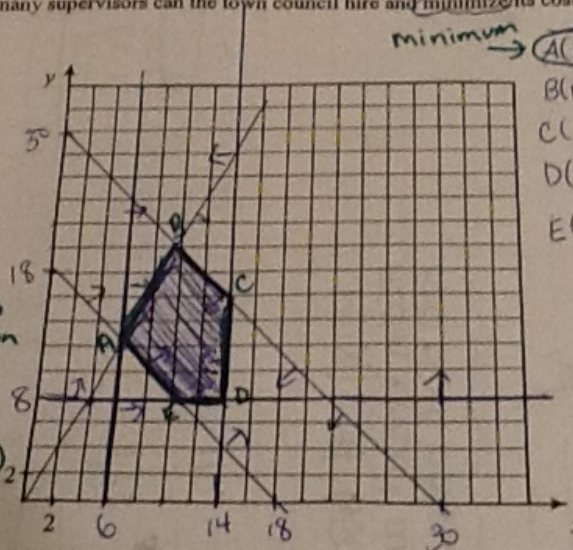
Step 1: Figure out your equations.

Step 2: Graph.

Step 3: Find the points of your polygon.

Step 4: Plug all points into your optimizing function (cost/revenue/profit).

Step 5: Answer question (max/min/coordinates...)



minimum \rightarrow

	$P = 3500x + 1500y$	Cost
A(6, 12)	$3500(6) + 1500(12)$	39,000
B(10, 20)	$3500(10) + 1500(20)$	65,000
C(14, 16)	$3500(14) + 1500(16)$	73,000
D(14, 8)	$3500(14) + 1500(8)$	61,000
E(10, 8)	$3500(10) + 1500(8)$	47,000

Answer: The town should hire 6 supervisors and 12 staff workers in order to minimize its costs.

TOPIC 1: OPTIMIZATION TEST #1

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Cindy is in charge of buying food for the school cafeteria. She wants to buy two types of bread: raisin bread and olive bread. Cindy must respect the following constraints:

- she can store at most 1000 loaves of bread; $x + y \leq 1000$
- she must buy at least 200 loaves of raisin bread; $x \geq 200$
- she must buy at least 100 loaves of olive breads but no more than 350; $y \geq 100, y \leq 350$
- she must buy at least as many loaves of raisin bread as olive bread; $x \geq y$

The cafeteria makes a \$0.10 profit on each loaf of raisin bread and a \$0.20 profit on each loaf of olive bread.

$$P = 0.10x + 0.20y$$

How many loaves of bread of each type must Cindy buy to maximize the cafeteria's profits?

inequalities polygon vertices & maximize the answer the question

	$P = 0.10x + 0.20y$	P
A(200, 100)	$0.10(200) + 0.20(100)$	40
B(200, 200)	$0.10(200) + 0.20(200)$	60
C(350, 350)	$0.10(350) + 0.20(350)$	105
D(650, 350)	$0.10(650) + 0.20(350)$	135 ← max
E(900, 100)	$0.10(900) + 0.20(100)$	110

Max is at 650 raisin bread and 350 olive bread.

