1. A carpenter makes bookcases in 2 sizes, large and small. It takes 4 hours to make a large bookcase and 2 hours to make a small one. The profit on a large bookcase is $35 and on a small bookcase is $20. The carpenter can spend only 32 hours per week making bookcases and must make at least 2 of the large and at least 4 of the small each week. How many small and large bookcases should the carpenter make to maximize his profit? What is his profit?

x: # of large bookcases

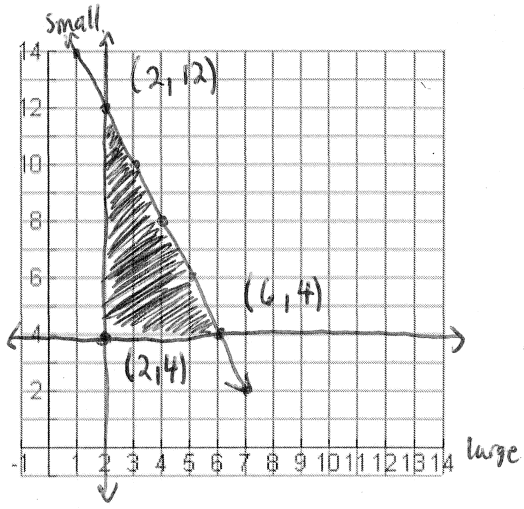
y: # of small bookcases

Constraints: $4x+2y \leq 32 \rightarrow 2y \leq -4x+32$

$y \leq -2x+16$

$x \geq 2$

$y \geq 4$



Objective: $35x+20y=P$

(x,y)	(2,4)	(6,4)	(2,12)
P	150	290	310

Max profit when 2 large and 12 small bookcases are made

2. A small town is trying to establish a transportation system of large and small vans. It can spend no more than $100,000 for purchasing both sizes of vehicles and no more than $500 per month for maintenance. The town can purchase a small van for $10,000 and maintain it for $100 per month. The large vans cost $20,000 each and can be maintained for $75 per month. Each large van carries a maximum of 15 passengers and each small van carries a maximum of 7 passengers. Find the maximum number of passengers the transportation system can handle given the constraints. How many large and small vans will they need to maximize the number of passengers it can service?

x: # of large vans

y: # of small vans

Constraints:

$20000x+10000y \leq 100000 \rightarrow 10000y \leq -20000x+100000$

$y \leq -2x+10$

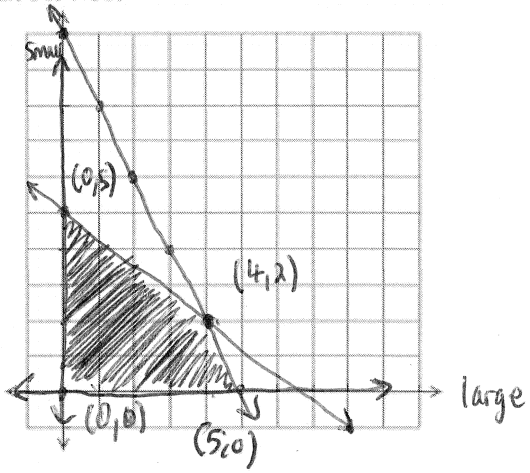
$75x+100y \leq 500 \rightarrow 100y \leq -75x+500$

$y \leq -\frac{3}{4}x+5$

$x \geq 0$

$y \geq 0$

Objective (max passengers): $15x+7y=P$



(x,y)	(0,0)	(5,0)	(4,2)	(0,5)
P	0	75	74	35

Max passengers: 75

5 large, no small vans