

Section 5.4 – Practice Questions

The following word problems are about maximizing and minimizing profits, costs, etc.

1. A manufacturer makes two types of bikes: downhill and all-terrain. Use the following information to determine the maximum profit.

	Downhill	All-terrain	Max Time Available
Assembly	2 hrs	1 hr	40 hrs
Finish	1 hr	1hr	32 hrs
Profit	\$70	\$50	

$M = 70d + 50a$

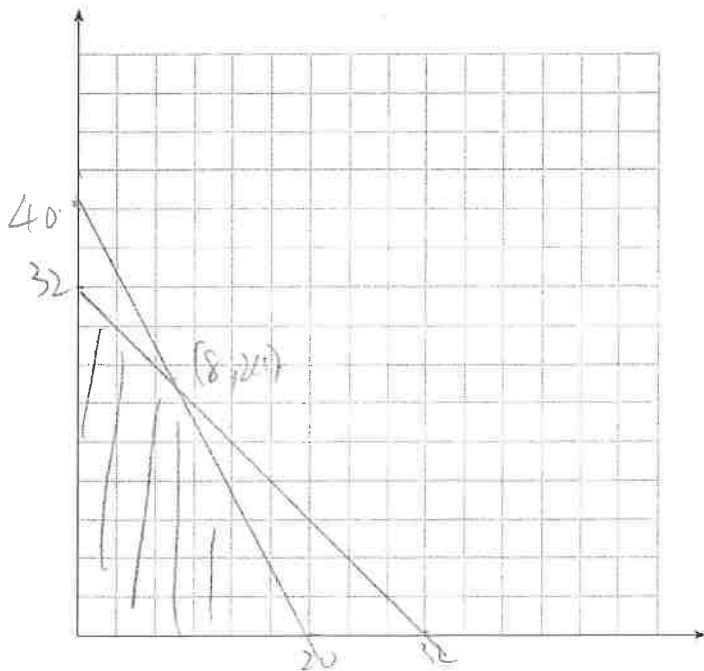
$2d + a \leq 40$

$d + a \leq 32$

$d, a \geq 0$

vertex	70d + 50a
(0, 0)	0
(8, 24)	1760
(0, 32)	1600
(20, 0)	1400

max \$1760



2. A farmer has 10 acres of land for planting wheat and corn. The cost and time are listed below. Find the maximum profit

ex 2.

	Wheat	Corn	Max
Prep Cost per Acre	\$60	\$30	\$1800
Work per Acre	3	4	120
Profit per Acre	\$180	\$100	

$$M = 180w + 100c$$

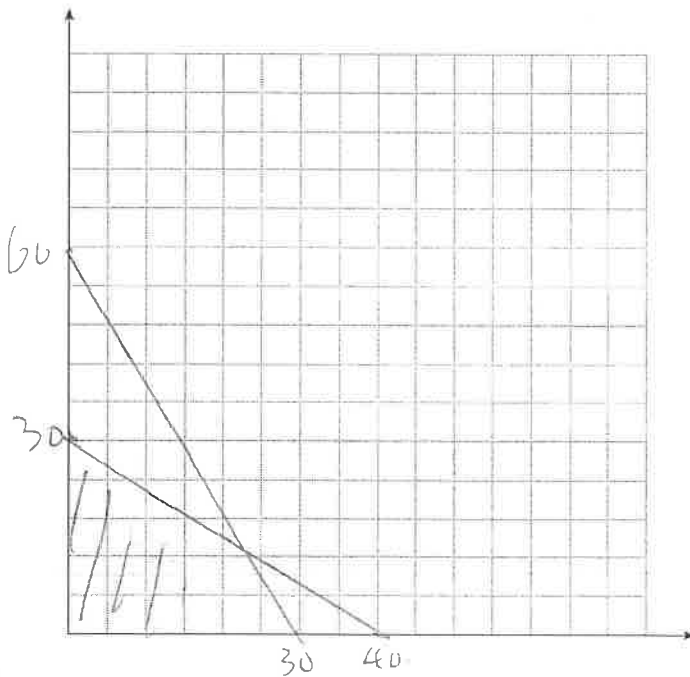
$$60w + 30c \leq 1800 \rightarrow 2w + c \leq 60$$

$$3w + 4c \leq 120$$

$$w, c \geq 0$$

vertex	$180w + 100c$
(0,0)	0.0
(0,30)	3000
(30,0)	<del>5400</del>
(24,12)	5520

max profit is \$5520



3. A small manufacturer makes toy cars and boats. The information given shows maximum assembly and finish time allowed, plus the profit. How many toy cars and boats should be made per day to maximize profit, and how much is it.

	Car	Boats	Max Hours per Day
Assembly	$\frac{1}{2}$ hr	2 hrs	8 hrs
Finish	1 hr	2 hrs	12 hrs
Profit	\$20	\$50	

$$P = 20C + 50T$$

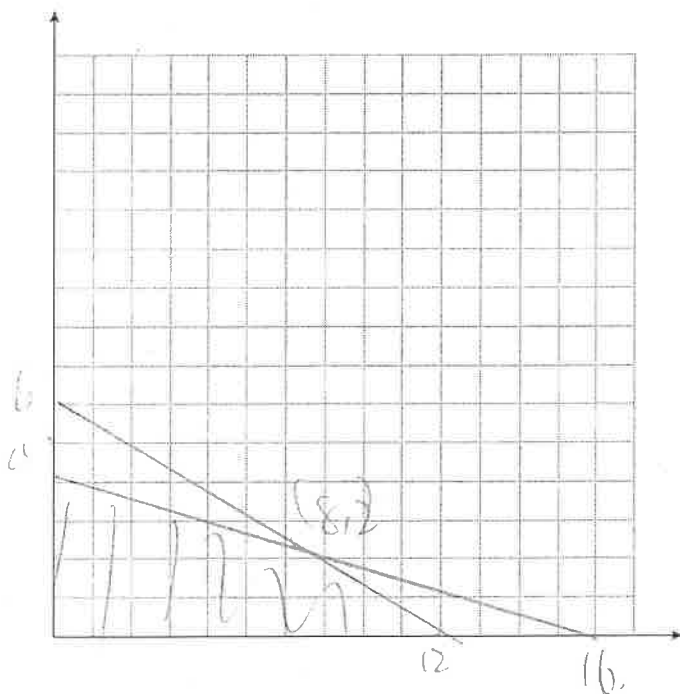
$$\frac{1}{2}C + 2T \leq 8$$

$$C + 2T \leq 12$$

$$C, T \geq 0$$

vertex	$20C + 50T$
(0, 0)	0
(0, 4)	200
(8, 2)	260
(12, 0)	240

max \$260 when 8 cars and 2 trucks



4. Two vitamin pills, A and B, have the following units of carbohydrates, protein and fats. The minimum units needed each day is listed in the table.

	A	B	Min. Units
Carbs	2	1	6
Protein	4	1	8
Fat	1	2	6
Cost per pill	40 cents	30 cents	

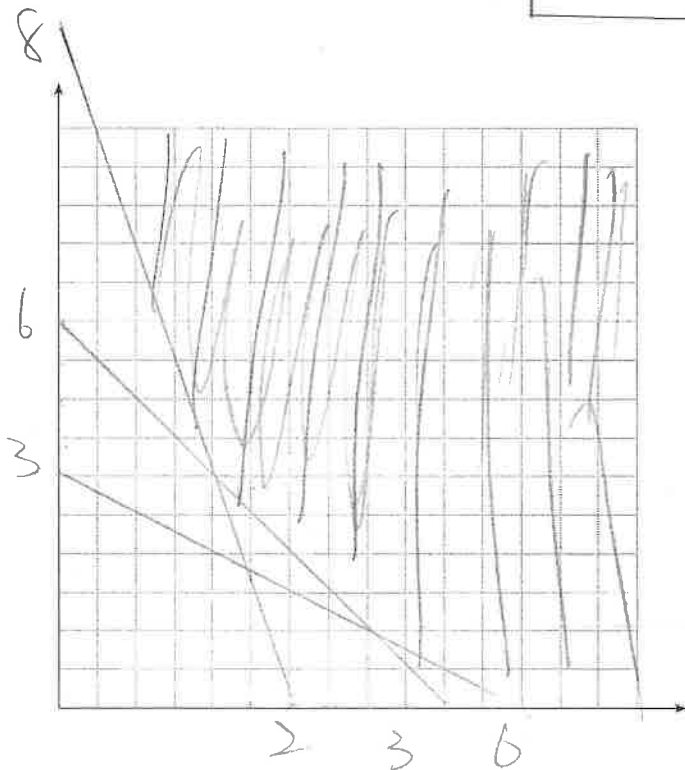
$M = 0.4A + 0.3B$

$2A + B \geq 6$

$4A + B \geq 8$

$A + 2B \geq 6$

Vertex	$0.4A + 0.3B$
(0, 8)	2.40
(6, 0)	2.40
(1, 4)	1.60
(2, 2)	1.40



take 2 vitamin and 2 vitamin B at a cost of \$1.40

5. A company produces three models of TV's at two production lines, A and B. The following table shows the minimum number of each TV needed to meet production quota with the cost. How many TV's should be produced on assembly lines A and B to minimize cost, and what is it?

	A	B	Min.
32 inch	400	400	4000
46 inch	200	400	2400
60 inch	300	100	1800
Cost per Week	\$15 000	\$20 000	

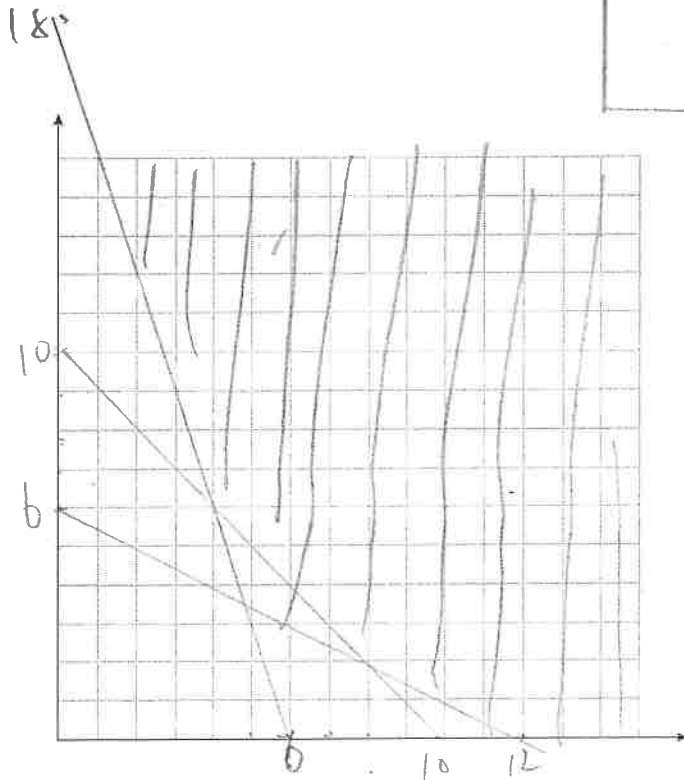
$$C = 15000A + 20000B$$

$$400A + 400B \geq 4000 \rightarrow A + B \geq 10$$

$$200A + 400B \geq 2400 \rightarrow A + 2B \geq 12$$

$$300A + 100B \geq 1800 \rightarrow 3A + B \geq 18$$

vertex	$(15000A + 20000B)$
(0, 18)	360000
(4, 6)	180000
(8, 2)	160000
(12, 0)	180000



operate assembly line A  
for 8 weeks and assembly  
line B for 2 weeks  
Cost is \$160000