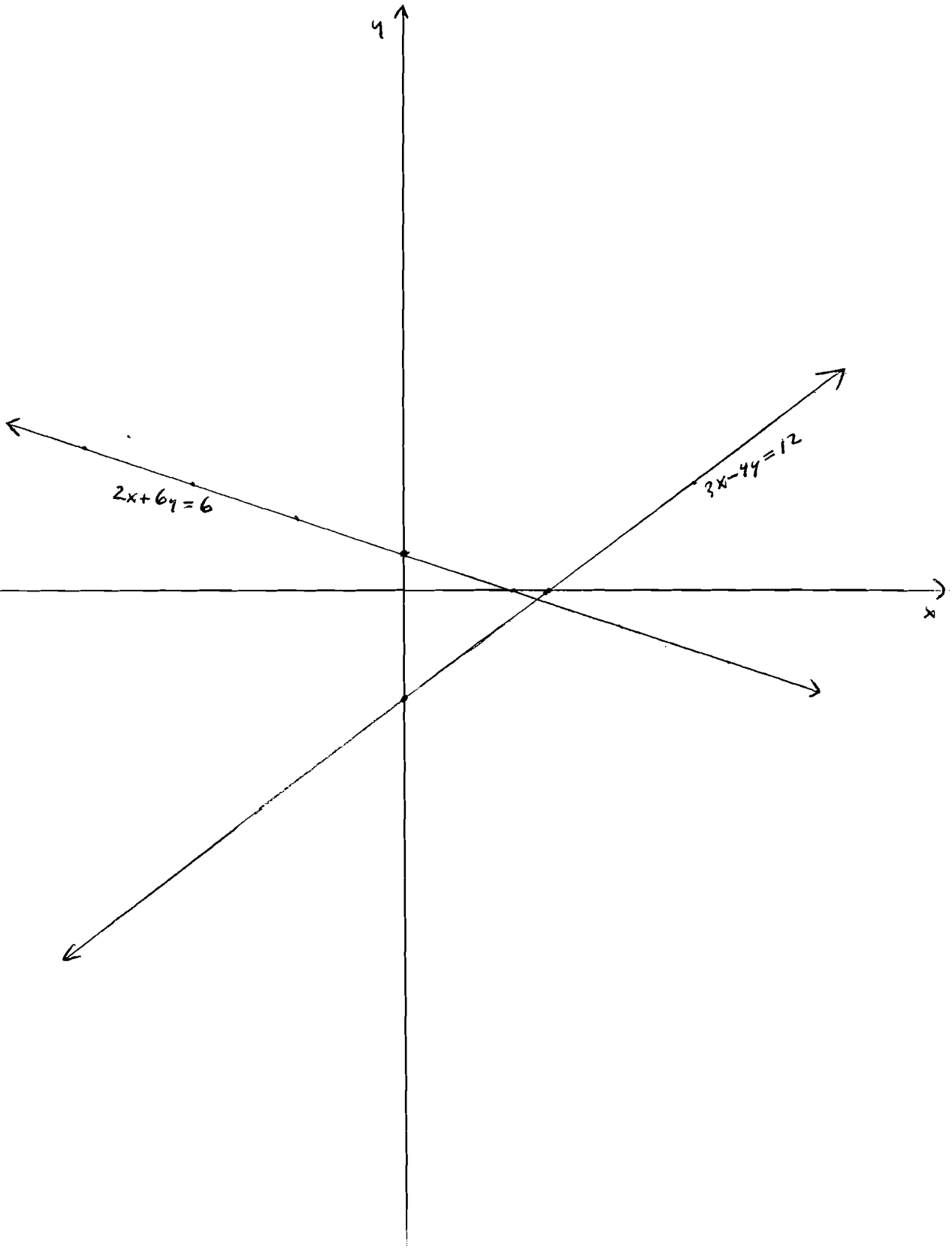
Solutions 5.1

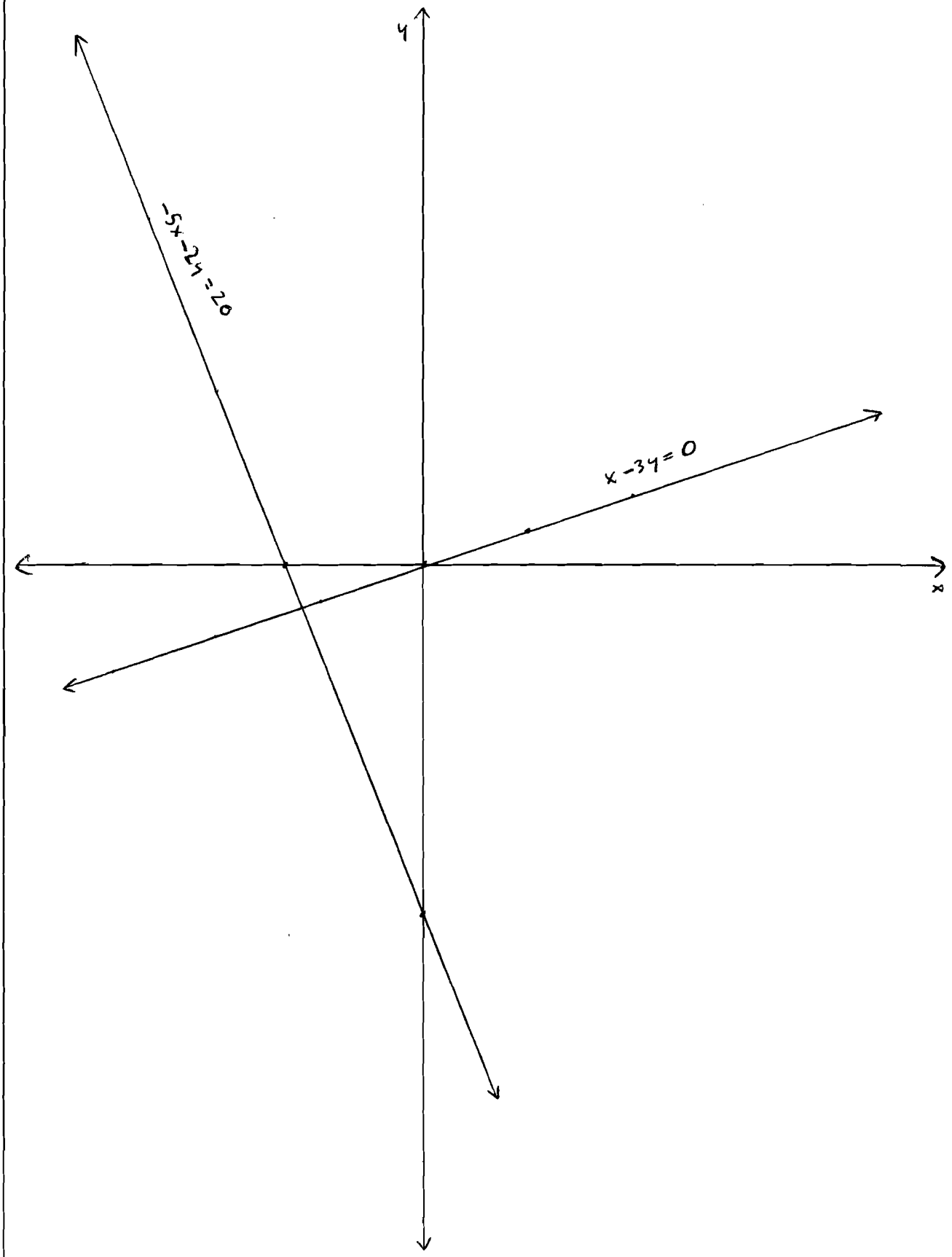
Problem

1



Problem

2



Problem	Ans	Reason
3	Price in $\frac{USD}{GAL}$ = Price in $\frac{CAD}{Lit}$ $\frac{3.2}{1.057}$	

An amount of gas used, and an amount spent

Amount Spent : p CAD

P USD

1 CAD = .8 USD so

p CAD = p (.8) USD = P USD

$P = (.8)p$

Amount used : a Lit

A gal

1 Lit = 1.057 quart, 1 quart = 1/4 gal

a Lit = a 1.057 quart = a 1.057 $\frac{1}{4}$ gal

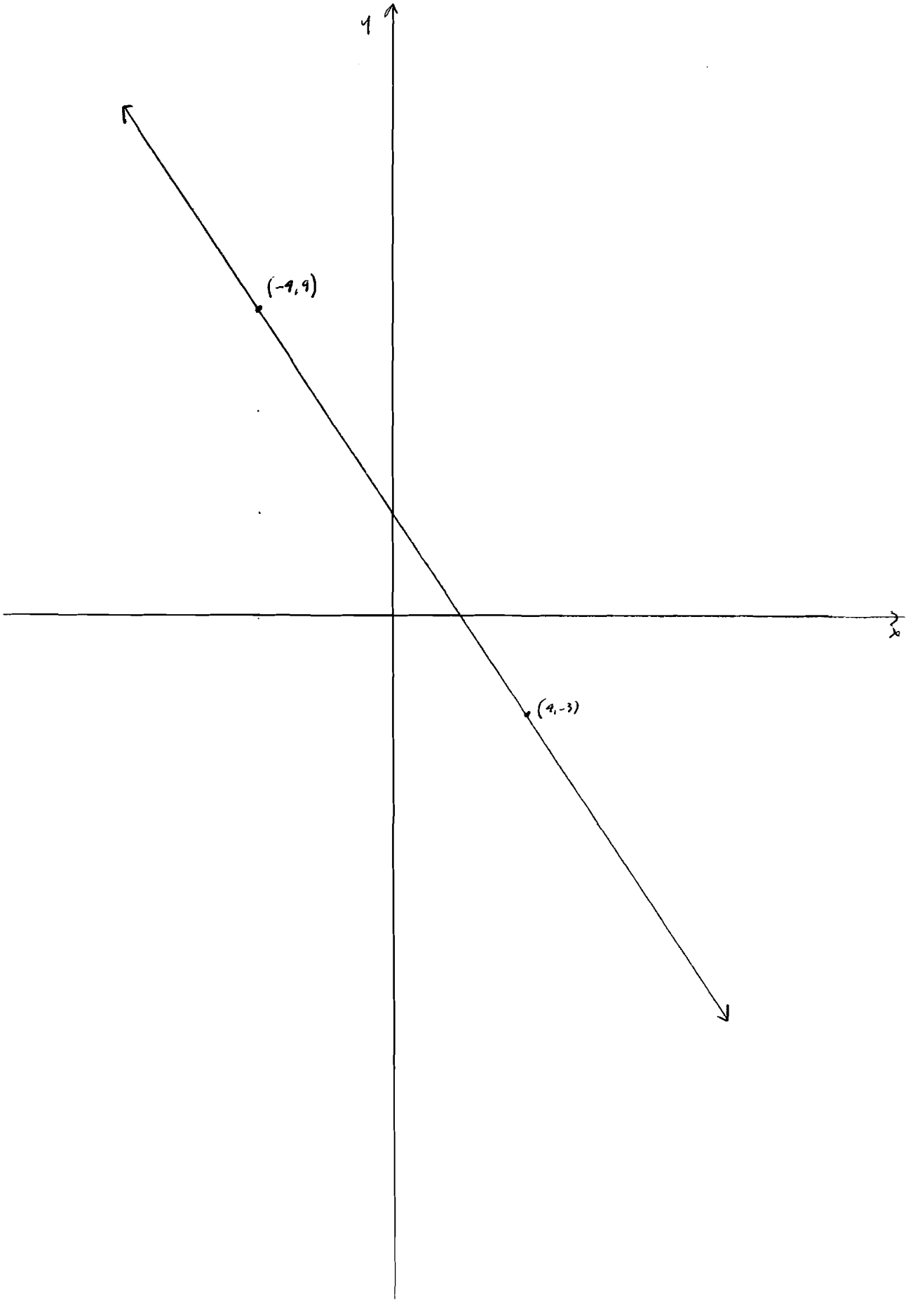
= A gal

$A = a \frac{1.057}{4}$

Price in $\frac{USD}{GAL} = \frac{P}{A} = \frac{.8p}{1.057/4\ a} = \frac{4(.8)}{1.057}\frac{p}{a} = \frac{3.2}{1.057}$ price in $\frac{CAD}{Lit}$

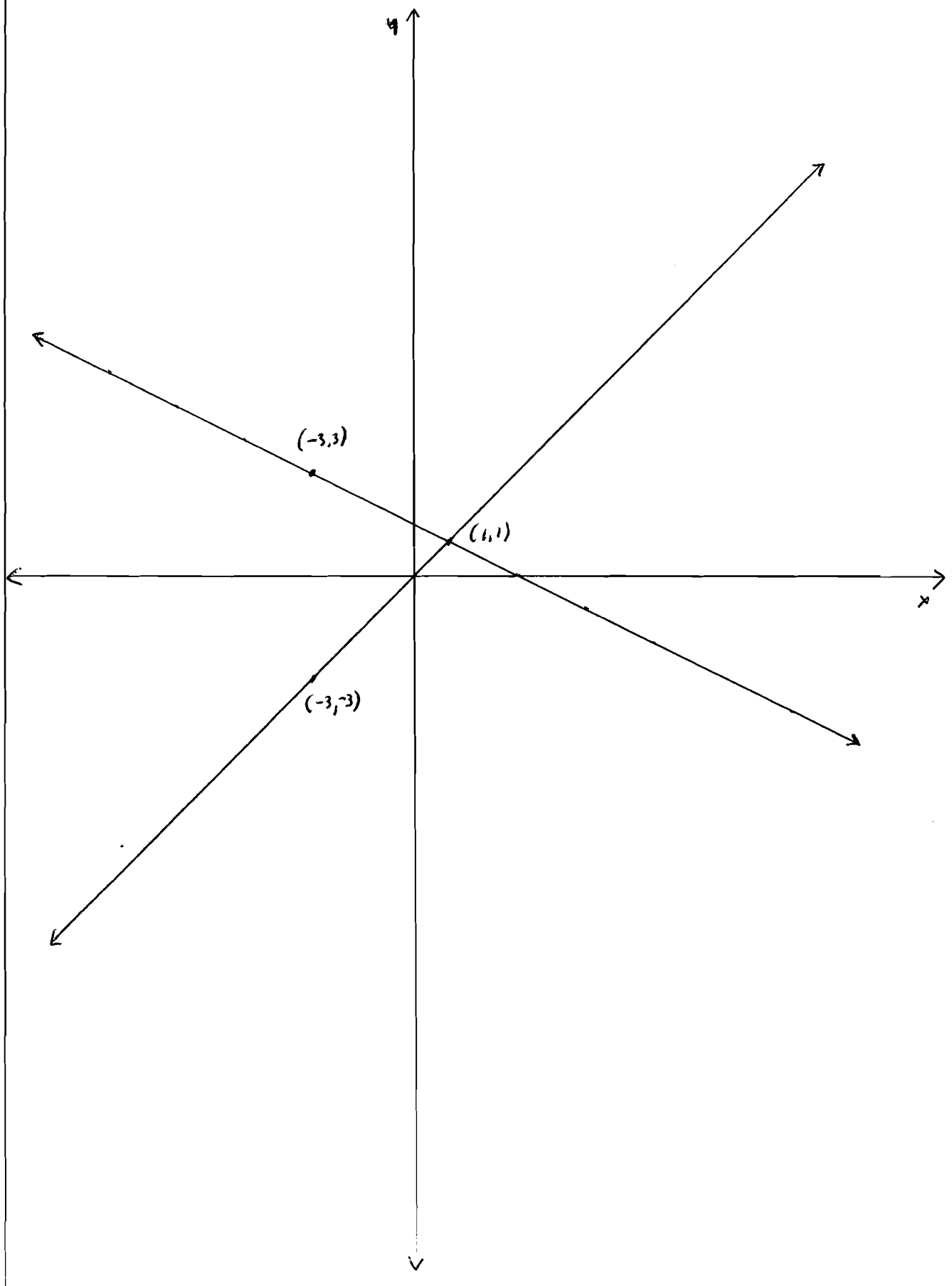
Problem

4

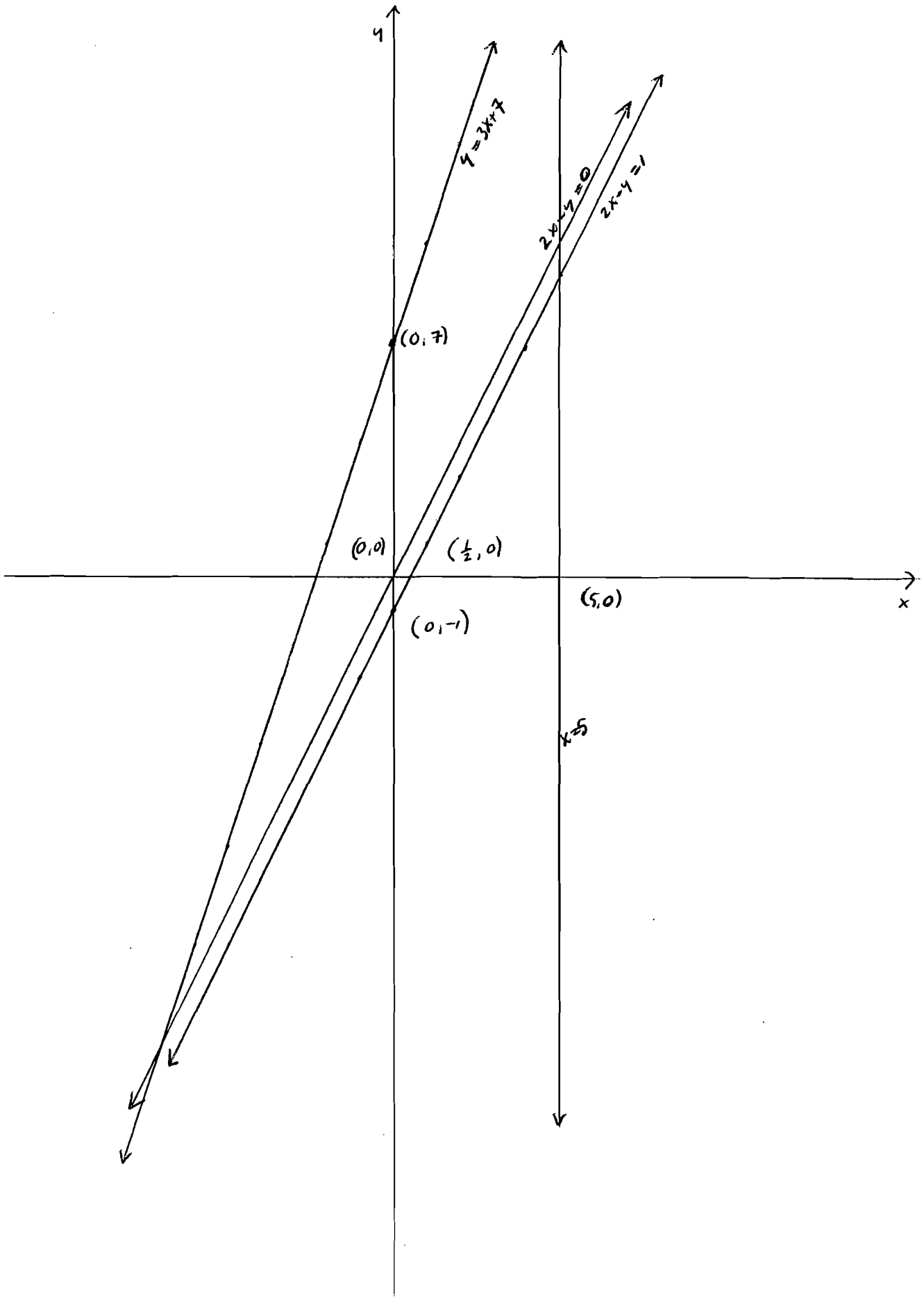


Problem

5



6

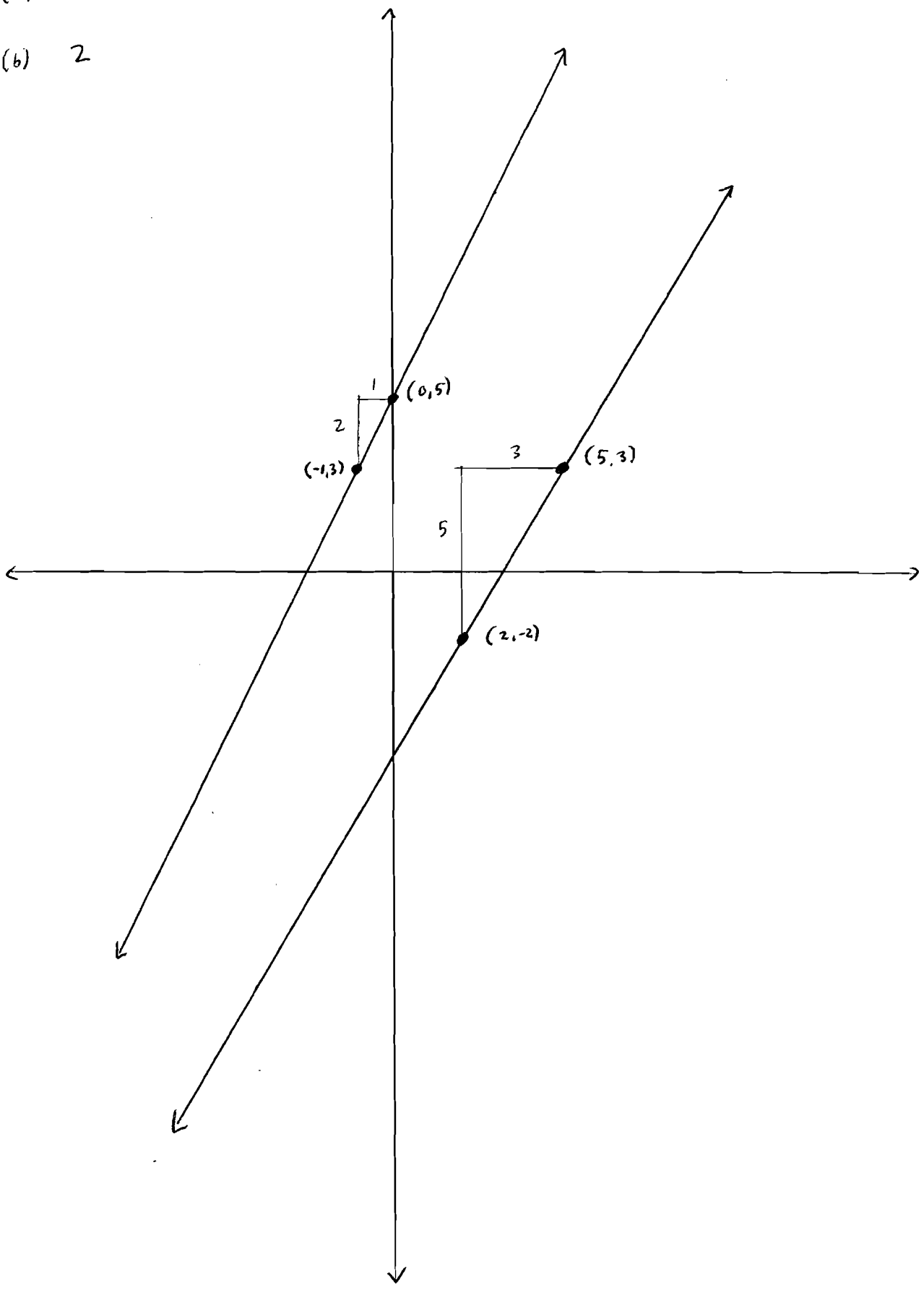


Problem

7

7 (a) $5/3$

(b) 2



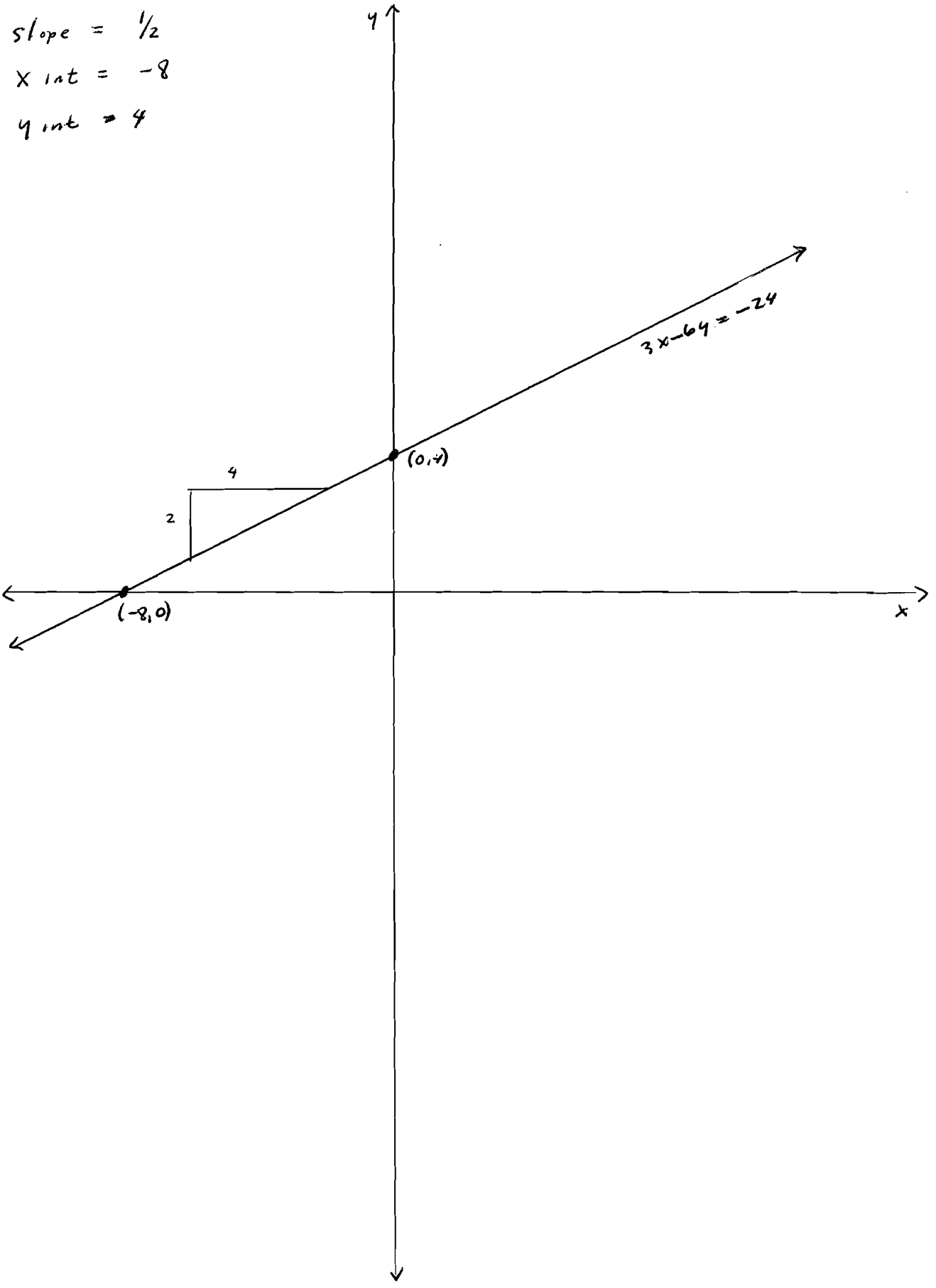
Problem 8

8

slope = 1/2

x int = −8

y int = 4



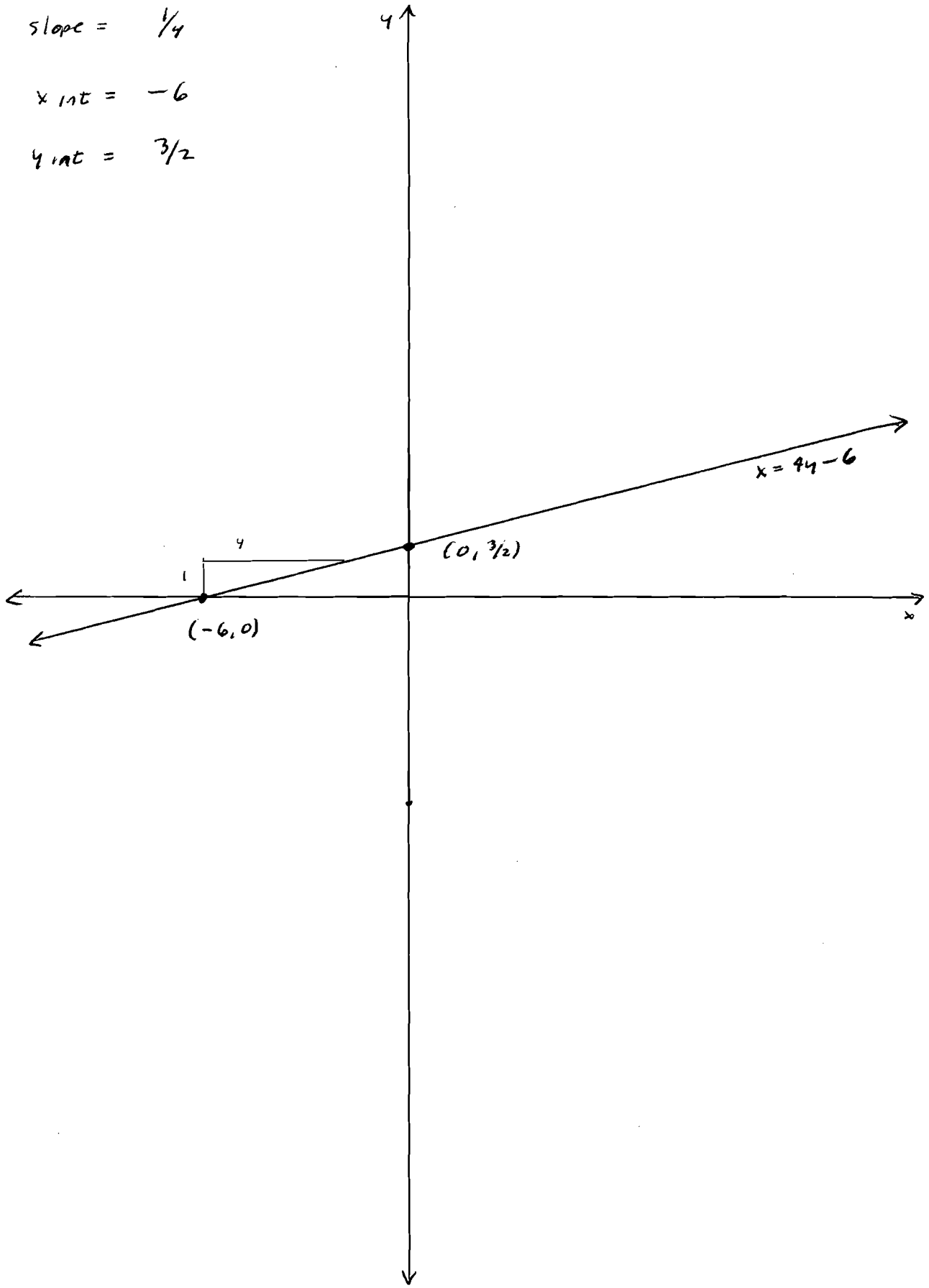
Problem 9

9

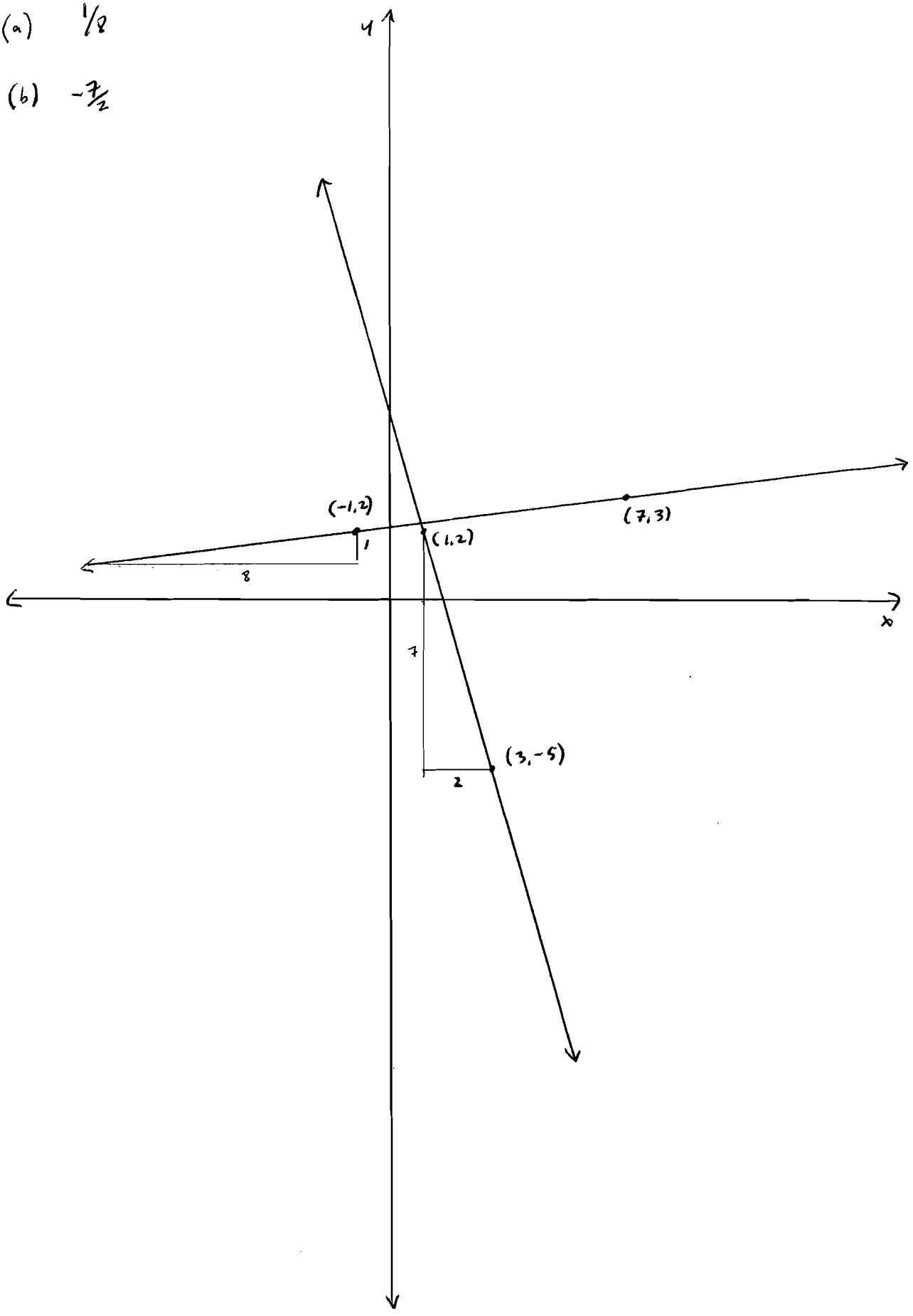
slope = $1/4$

x int = -6

y int = $3/2$

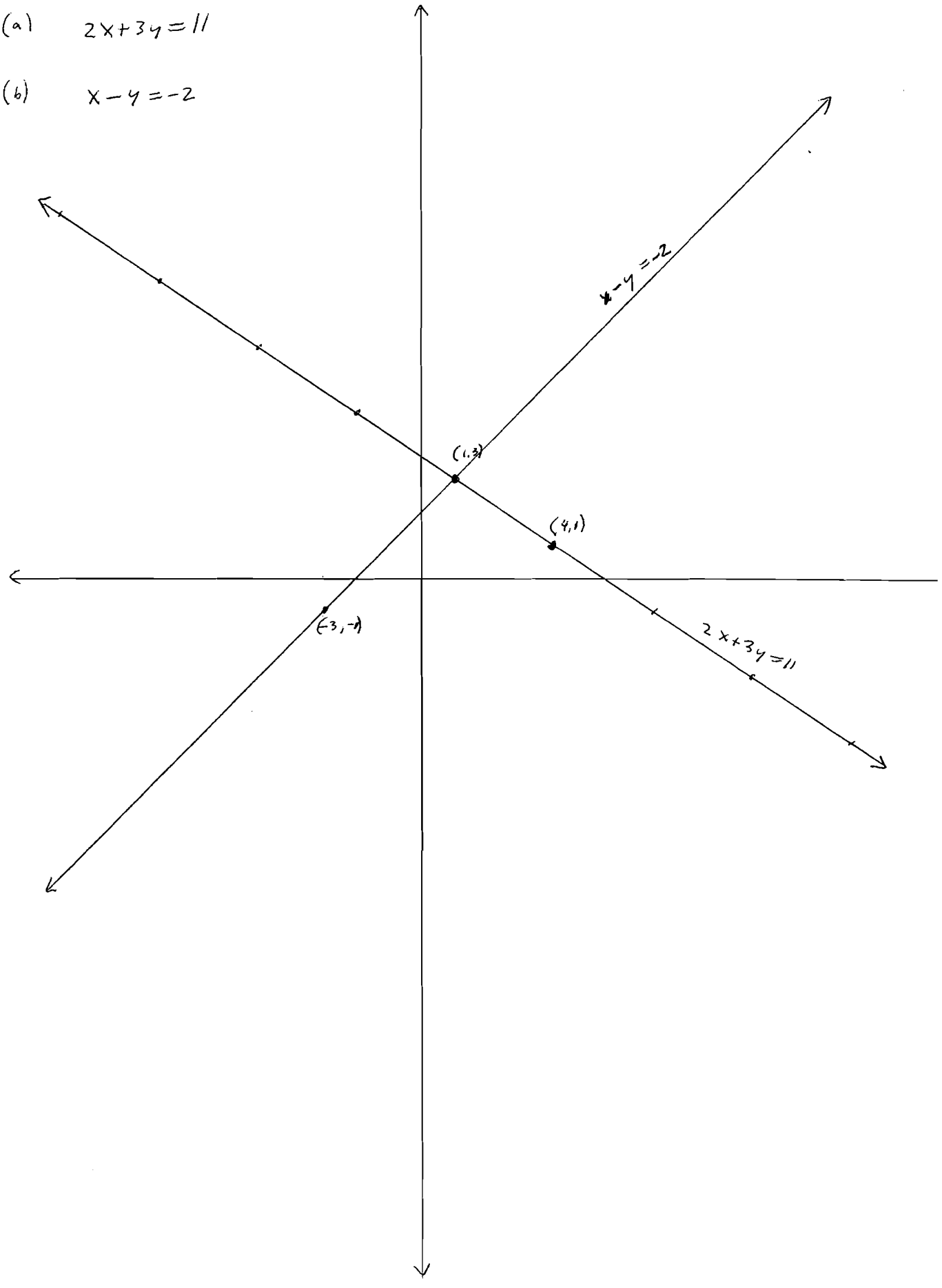


Problem	
10	(a) $1/8$ (b) $-7/2$



11 (a) $2x+3y=11$

(b) $x-y=-2$



Problem	Ans	Reason
12	$330	y = dollar cost x = number of days rented

$y = mx + b$ Find m, b

$$105 = m\,2 + b$$
$$285 = m\,6 + b$$

$4m = (6-2)m = 285 - 105 = 180$ $\quad m = \frac{180}{4} = 45$

$$b = 105 - 2 \cdot 45$$
$$= 15$$

Cost of 7 day rent $= m\,7 + b$
$= 45 \cdot 7 + 15 = 330$

13	$1.10	y = dollar cost of call x = duration of call in minutes

$y = mx + b$ Find m, b

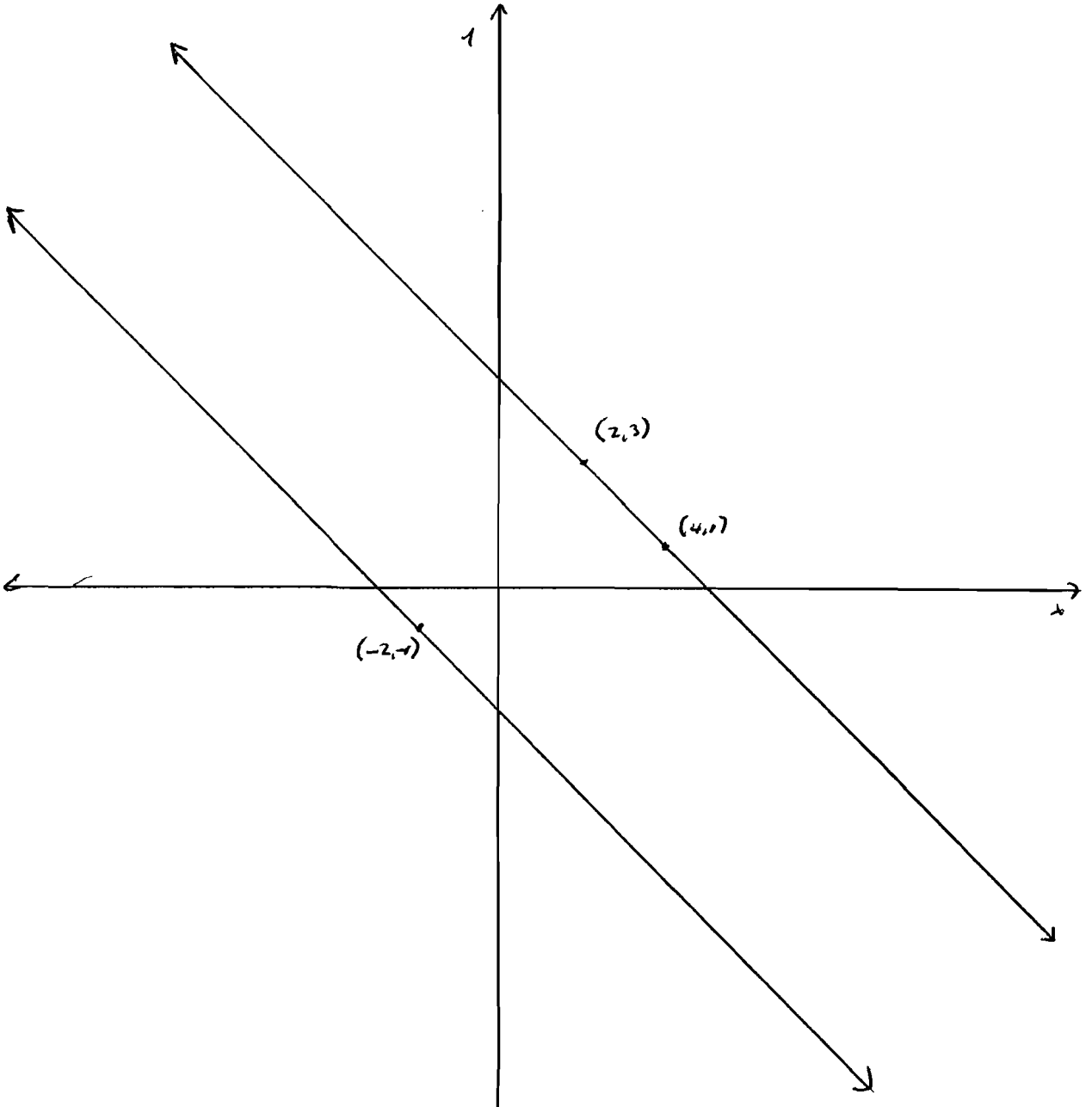
$$.70 = m\,20 + b$$
$$1.00 = m\,35 + b$$

$15m = (35-20)m = .30$ $\quad m = \frac{.30}{15} = .02$

$b = .70 - (.02)20 = .70 - .40 = .30$

cost of 40 min call is $(.02)40 + .30 = .80 + .30 = 1.10$

Problem	
14	(a) $y - 0 = -3(x - 1)$
	(b) $y = -2$
	(c) $x = 3$
15	$x + y = -3$



Problem	Ans	Reason
16	1840	y = dollar cost of paving the Lot. x = area of Lot in sq feet $y = mx + b$ Find m, b $1200 = m\,1000 + b$ $1600 = m\,1500 + b$ $500m = (1500 - 1000)m$ $= 1600 - 1200$ $= 400$ $m = \frac{400}{500} = 4/5$ $b = 1200 - 4/5\,1000 = 1200 - 800 = 400$ cost of paving 1800 sq feet is $4/5\ 1800 + 400 = 1440 + 400 = 1840$
17	18	y = # defective balls in one day x = total # of balls in one day $y = mx + b$ Find m, b $10 = m\,300 + b$ $15 = m\,425 + b$ $5 = m\,125$ $m = 5/125 = 1/25$ $b = 10 - \frac{1}{25}\,300 = 10 - 12 = -2$ $\frac{1}{25}(500) - 2 = 20 - 2 = 18$

Problem	Ans	Reason
18	675	Find max x such that $y \leq 25$

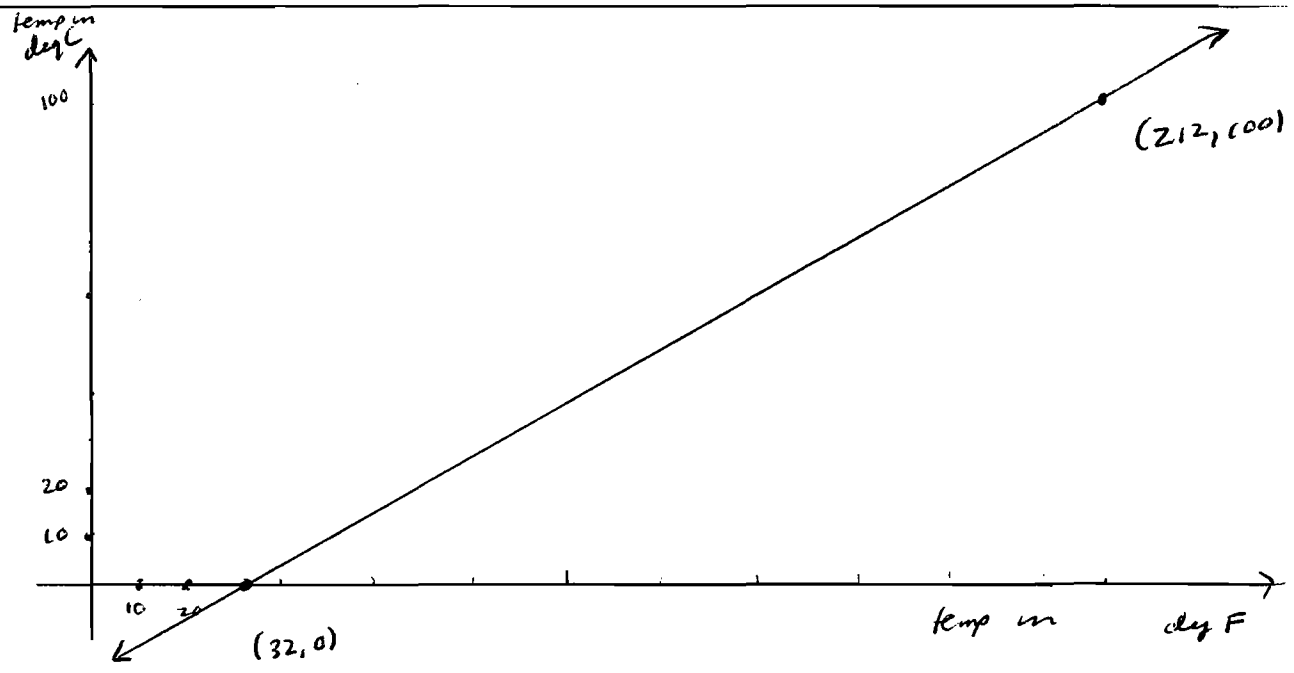
$25 \geq y$

$25 \geq \frac{x}{25} - 2$

$27.25 \geq x$ $\quad 27.25 = 675$

Problem

19



$$\text{slope} = \frac{100-0}{212-32} = \frac{100}{180} = \frac{10}{18} = 5/9$$

20

Data are Linear if and only if these coincide:

$$\frac{8000-6400}{}$$
$$\frac{6400-5200}{}$$
$$\frac{5200-4400}{}$$
$$\frac{4400-4000}{}$$

they are not the same, so Non Linear

Problem	Ans	Reason

21

y = dollar cost for 1 day

x = miles driven in 1 day

a) $y = (.30)x + 40$

b) $y = (.50)x + 30$

For $x = 30$

Case	y
(a)	49
(b)	45

(b) is Less expensive

22

(a) cheaper

225 miles in 3 days

$225/3 = 75$ 75 miles / day

Case	y	
(a)	$(.30)75 + 40 =$	62.50
(b)	$(.50)75 + 30 =$	67.50

Problem	Ans	Reason
23	$415	y = monthly operating cost x = # copies made per month

$y = mx + b$

$\$565.00 = m\ 20000 + b$

$\$940.00 = m\ 35000 + b$

$15000m = 940 - 565 = 375$

$m = 375/15000$

$b = 565 - 375 \frac{20000}{15000}$

$= 565 - 375 \frac{20}{15} = 565 - 500 = 65$

$375 \frac{14000}{15000} + 65 = 375 \frac{14}{15} + 65$

$= 25 \cdot 14 + 65 = 350 + 65 = 415$

Problem	Ans	Reason
24	140 days	y = cost of lease in dollars y = length of lease in days

$y = mx + b$ Find m, b

$5000 = m\,60 + b$

$7250 = m\,90 + b$

$30m = m(90-60) = 7250 - 5000$

$= 2250$

$m = \frac{2250}{30} = \frac{225}{3} = 75$

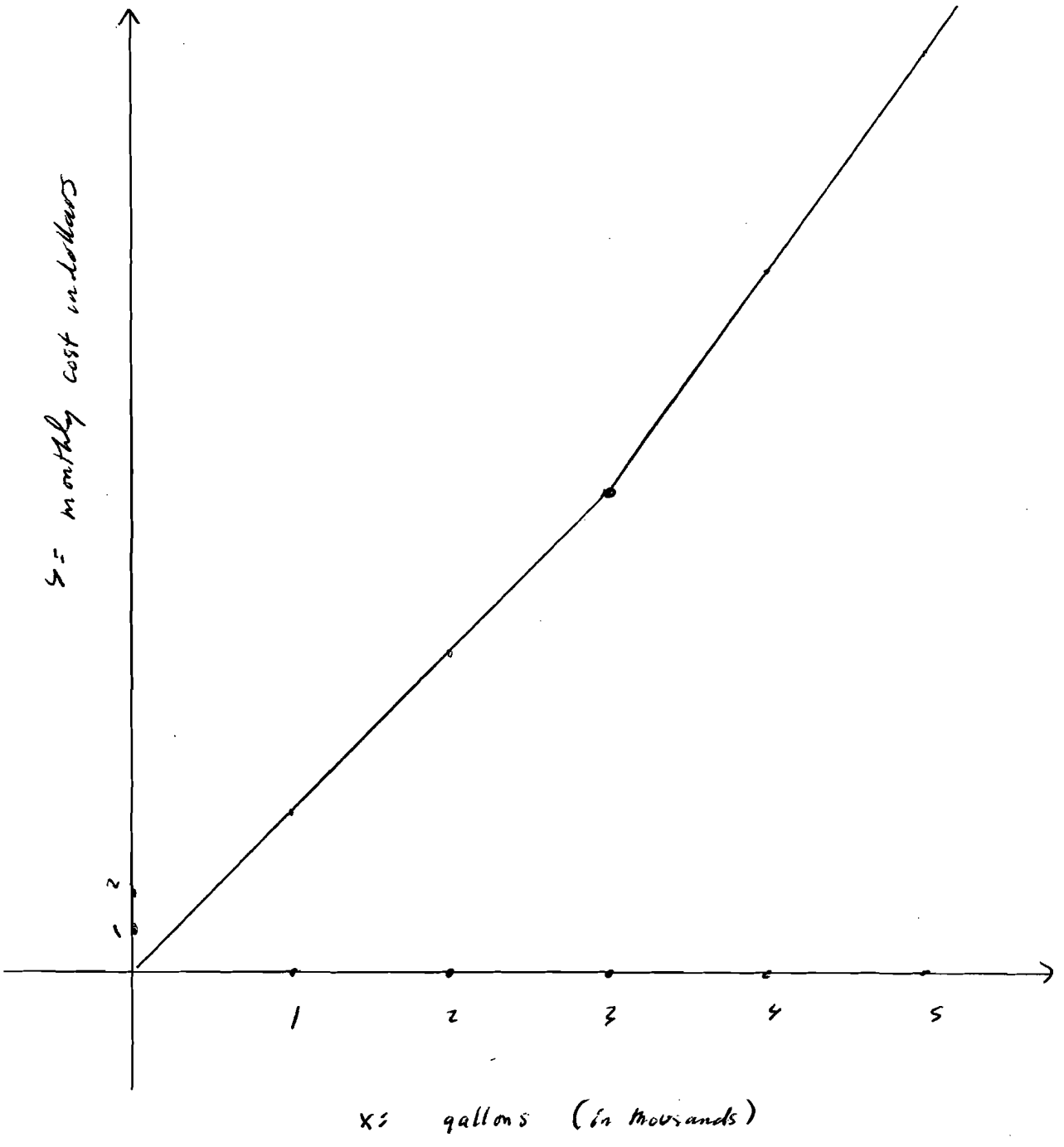
$b = 5000 - 60 \cdot 75 = 5000 - 4500 = 500$

$11000 = 75x + 500$ Find x

$x = \frac{11000 - 500}{75} = \frac{10500}{75} = 140$

Problem

25



$$y = \begin{cases} 4x & 0 \le x \le 3 \\ 5.5x - 4.5 & 3 \le x \end{cases}$$

Problem	Ans	Reason
26	$d = \frac{1}{9} t$	d = distance in miles t = time elapsed in min s = speed in m/min

3 hr 54 min

$$d = st$$

$$\frac{1}{4} = s\left(2 + \frac{1}{4}\right)$$

$$\frac{1}{4} = s\,\frac{9}{4}$$

$$s = \frac{1}{9}$$

Marathon = 26 miles

$$26 = \frac{1}{9} t$$

$$t = 26 \cdot 9 = 234$$

234 min = 3 hr 54 min

Problem	Ans	Reason

27

t = tax in dollars

i = income in dollars

$$t = \begin{cases} (.10)\, i & 0 \le i \le 7150 \\ (.15)(i - 7150) + 715 & 7150 \le i \le 29050 \\ (.25)(i - 29050) + 4000 & 29050 \le i \le 70350 \\ (.28)(i - 70350) + 14325 & 70350 \le i \end{cases}$$

Problem	Ans	Reason
28	65 000 $	C = dollar cost of warehouse space a = sq feet of warehouse space

$C = ma + b$ Find m, b

$50000 = m\ 6000 + b$

$72\,500 = m\ 9000 + b$

$22500 = 3000\ m$

$m = \frac{22,500}{3000} = \frac{225}{30} = 7,5$

$b = 50\,000 - 7,5 \cdot 6000$

$= 50000 - 45000$

$= 5000$

$7,5\ (8000) + 5000 = 60000 + 5000$

$= 65\,000$

Problem	Ans

29

$$Ax_1 + By_1 = C \qquad B \neq 0$$
$$Ax_2 + By_2 = C$$

$$A(x_2 - x_1) + B(y_2 - y_1) = 0$$

Suppose $x_1 = x_2$ then $B(y_2 - y_1) = 0$ so $y_2 - y_1 = 0$

so $y_1 = y_2$ then $(x_1, y_1) = (x_2, y_2)$ contr.

30

a) For all pts (x, y). $0 \cdot x + 0 \cdot y = 0$ so (x, y) is sol.

b) For all pts (x, y) $0 \cdot x + 0 \cdot y \neq C$ so (x, y) not a sol.