

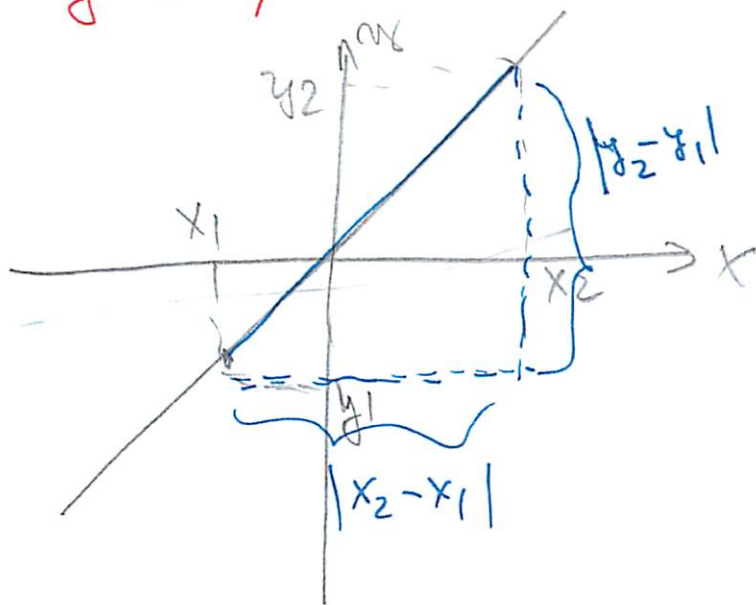
LINEAR FUNCTIONS AND THEIR PROPERTIES

def: $f(x) = mx + b$ is linear function where

$$m, b \in \mathbb{R}$$

m - slope

$(0, b)$ is y -intercept.



$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{\Delta y}{\Delta x}$$

if $m > 0$ line is increasing

if $m = 0$ line is constant

if $m < 0$ line is decreasing

$S(p)$ supply function

$D(p)$ demand function

$$S(p) = D(p)$$

$P \Rightarrow$ equilibrium price,
equilibrium quantity

$R(x)$ - revenue function

$C(x)$ - cost function

$P(x) = R(x) - C(x)$ - profit

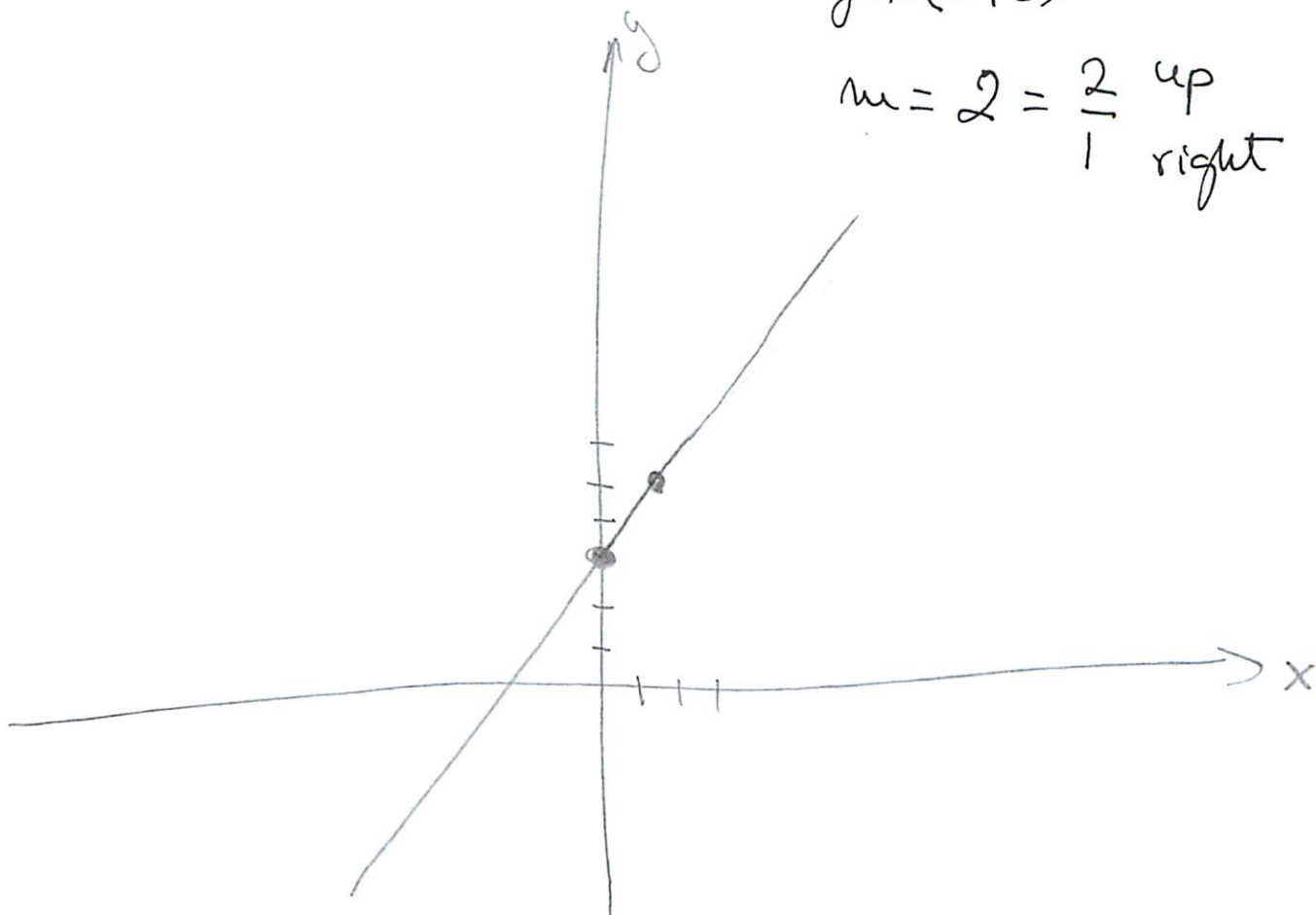
$R(x) = C(x)$ - break-even point

Ex: $y = 2x + 3$

Method 1 using y -intercept and slope

$y_{int} = (0, 3)$

$m = 2 = \frac{2}{1}$ up
right



Method 2 x-intercept y-intercept.

x-intercept $\Rightarrow y=0$

y-intercept $\Rightarrow x=0$

$$2x + 3 = 0$$

$$2x = -3$$

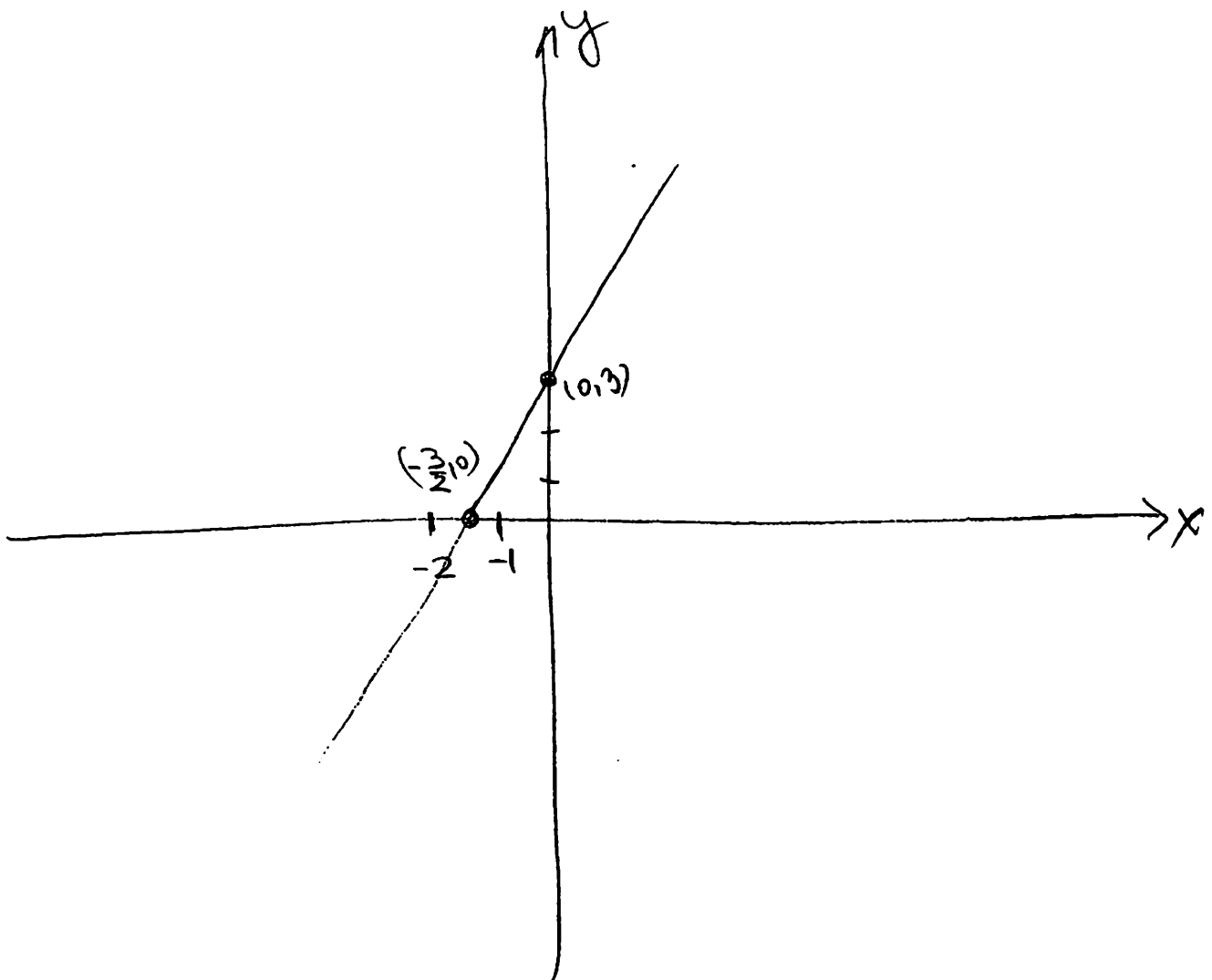
$$x = -\frac{3}{2}$$

$$\left(-\frac{3}{2}, 0\right)$$

$$y = 2 \cdot 0 + 3$$

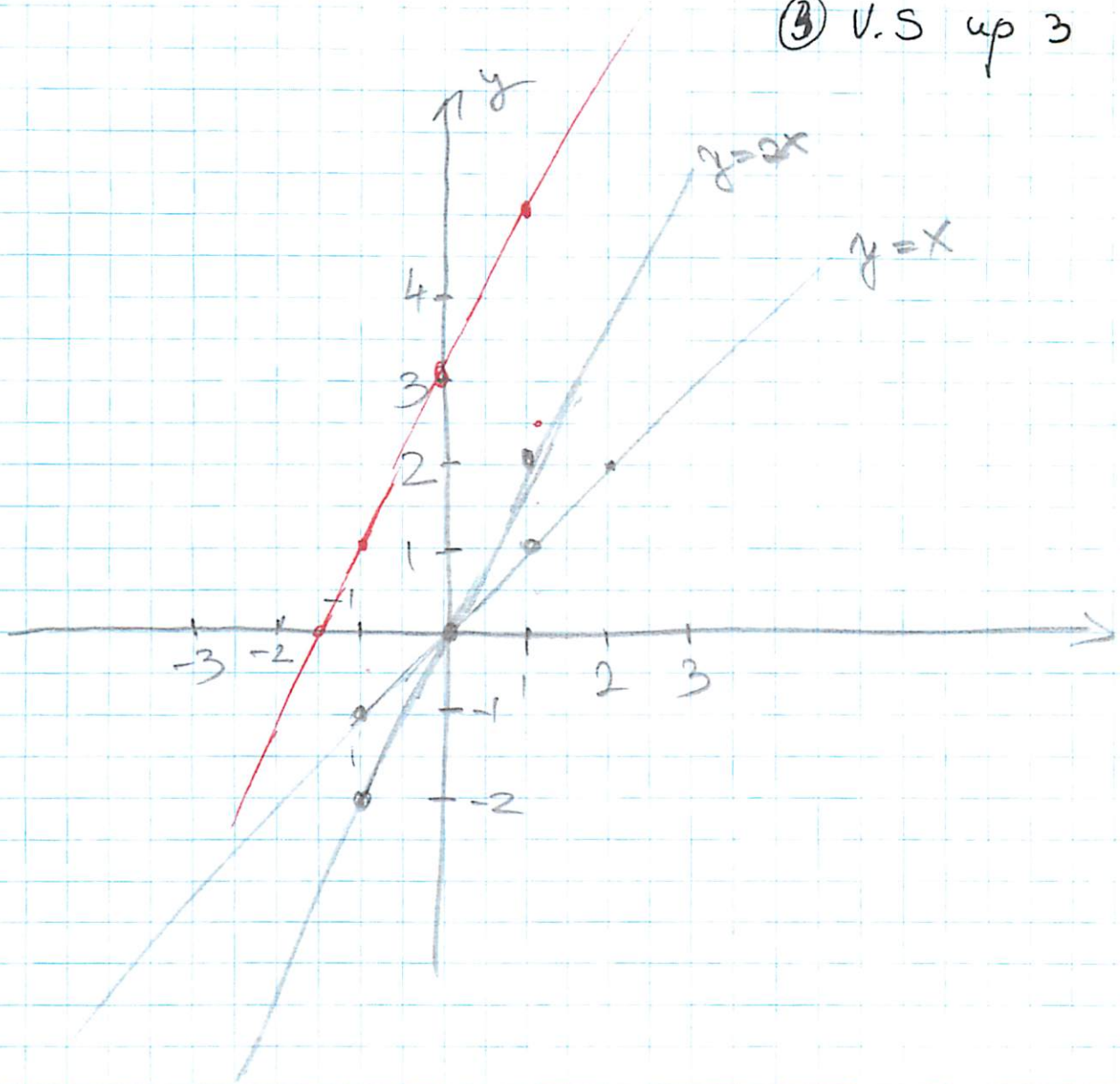
$$y = 3$$

$$(0, 3)$$



Method 3 transformation

- ① PF $y=x$
- ② v. stretch by 2
- ③ v. S up 3



Ex 38/280

$$C(x) = 0.38x + 5$$

a) $C(50) = 24$

b) $C(x) = 29.32 \quad x > ?$

$$29.32 = 0.38x + 5$$

$$x = 64$$

c) $C(x) = 60 \quad C(x) \leq 60$

$$60 \leq 0.38x + 5$$

$$x \leq 144$$

d. Domain $[0; 42,200]$

Ex 40/280.

$$S(p) = -2000 + 3000p$$

$$D(p) = 10,000 - 1000p$$

a) $S(p) = D(p) \quad -2000 + 3000p = 10,000 - 1000p$
 $p = 3$ equilibrium price.

$$S(3) = 7000 \text{ equilibrium quantity}$$

b) $D(p) < S(p) \quad 10,000 - 1000p < -2000 + 3000p$
 $p > 3$

c) the price will decrease.

Problem 44 / 280

$$R(x) = 12x$$

$$C(x) = 10x + 15000$$

a) $R(x) = C(x)$

$$12x = 10x + 15000$$

$$x = ~~7500~~ 7500$$

b) $R(x) > C(x)$

$$x > 7500$$

Problem 36 / 279

a) $f(x) = g(x)$

$$x = 7, \quad y = -8.$$

b) $g(x) < f(x) \leq h(x)$
 $x \in (-4, 7)$

Problem 30 / 279.

$$f(x) = 3x + 5 \quad ; \quad g(x) = -2x + 15$$

a) $f(x) = 0$

$$3x + 5 = 0$$

$$x = -\frac{5}{3}$$

b) $f(x) > 0$

$$x > -\frac{5}{3}$$

c) $f(x) = g(x)$

$$3x + 5 = -2x + 15$$

$$x = 2$$
$$(2, 11)$$

d) $f(x) > g(x)$
 $x > 2$

