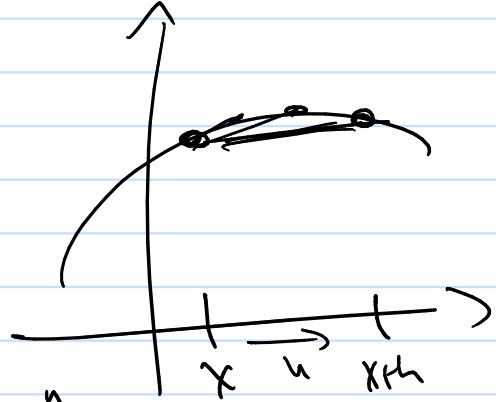


Math 112

Q's

$$\frac{f(x+h) - f(x)}{h}$$



$$f(x) = -4x^3$$

$$f(\square) = -4 \square^3$$

$$f(x+h) = -4(x+h)^3$$

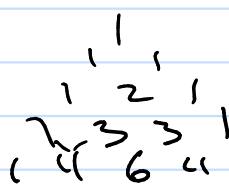
$$(a+b)^n$$

$$(a+b)^0 = 1$$

$$(a+b)^1 = a+b$$

$$(a+b)^2 = a^2 + 2ab + b^2$$

$$(a+b)^3 = a^3 + 3a^2b + 3ab^2 + b^3$$



$$f(x+h) = -4[x^3 + 3x^2h + 3xh^2 + h^3]$$

Hint on writing math
 $(x+3)(4+7) y$
 $[x+3](4+7) y$

Now:

$$\frac{f(x+h) - f(x)}{h} = \frac{[-4x^3 - 12x^2h - 12xh^2 - 4h^3] - [-4x^3]}{h}$$

$$= \frac{-12x^2(h) - 12x(h^2) - 4(h^3)}{h} = ?$$

$$\frac{-12x^2h - 12xh^2 - 4h^3}{h} = \frac{-4h [3x^2 + 3xh + h^2]}{h}$$

$$= -4 (3x^2 + 3xh + h^2)$$

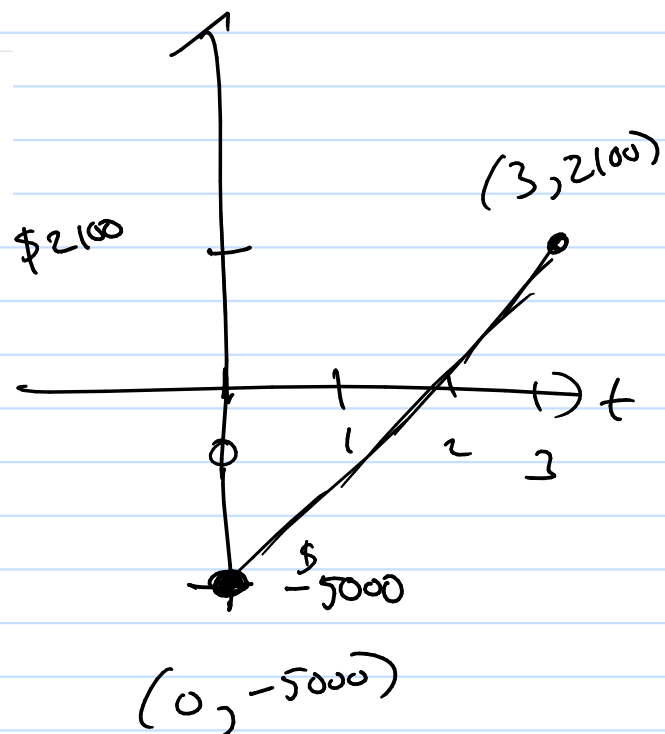
13

The business opened with a debt of \$5000. After 3 years, it accumulated profit of \$2100. Find the profit as a function of time t , knowing the profit function is linear.

$P(t) =$

$$P(t) = ?$$

$$P = \text{Rev} - \text{Cost}$$

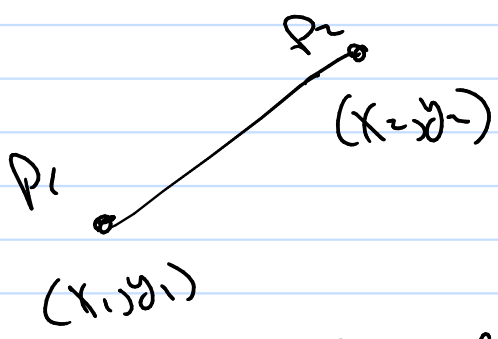


Lines?

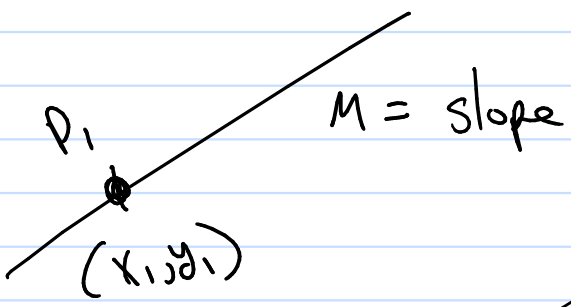
2.1

① slope

$$\text{slope} = \frac{y_2 - y_1}{x_2 - x_1}$$



② point slope form of the eqn of a line

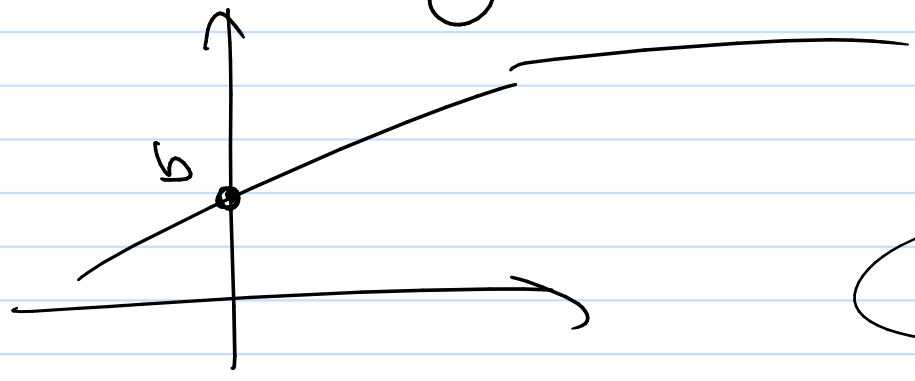


$$y - y_1 = m(x - x_1)$$

$$y = \underline{m(x - x_1)} + \underline{y_1}$$

③ slope intercept form

$$y = mx + b \quad \text{write like this}$$



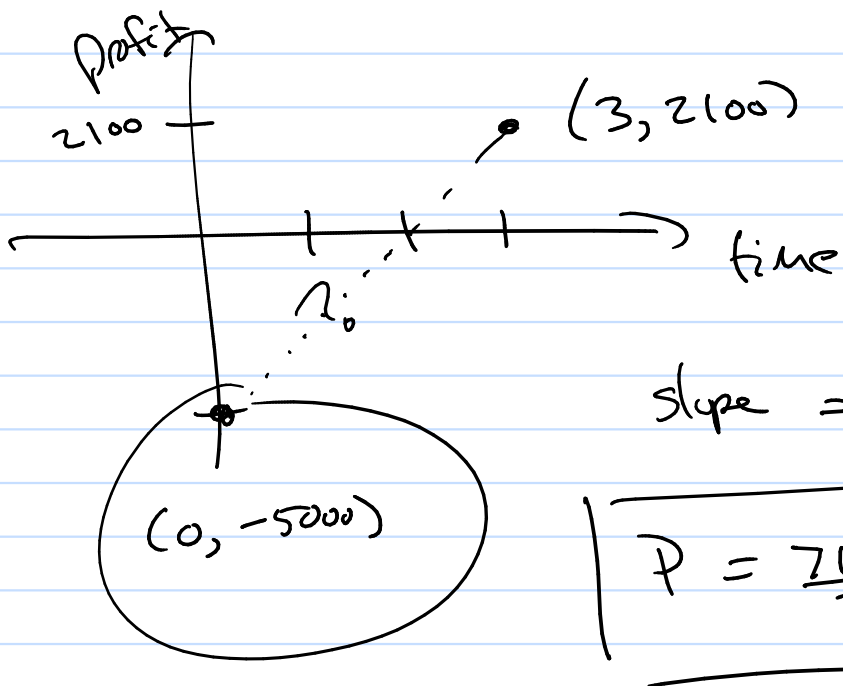
$$ay + bx = c$$

④ written as $ay + bx + c = 0$

standard form of a linear equation of x and y

⑤ Given a graph, knowing

① a point	→ Find the linear eqn
② a slope	



Applications of Linear Equations

① Linear Model (word problems)

Ⓧ Sales of a widget.

Costs \$2.10 to make a widget
 ↑ and try to sell

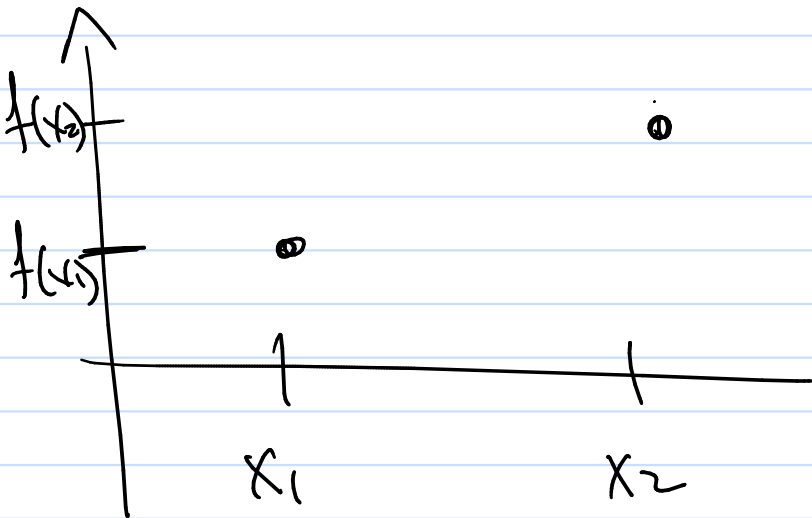
Revenue \$3.00

$$C(w) = 2.1w + \$4000$$

$$R(w) = 3w$$

$$P(w) = R(w) - C(w) = .9w - 4000$$

② Average Value over an interval



change in f over $[x_1, x_2]$

$$= \frac{\Delta f}{\Delta x} = \frac{f(x_2) - f(x_1)}{x_2 - x_1}$$

Δ means change

ex

find eqn's

slope
↓

intercept
↓

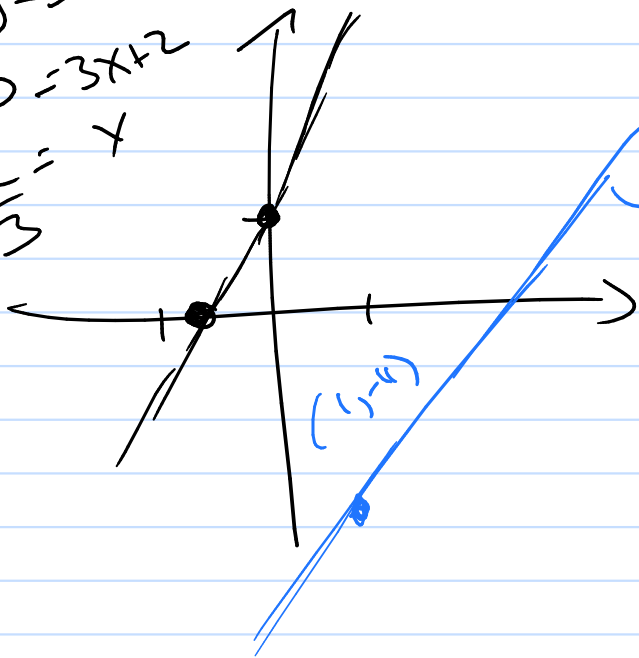
parallel: same slope
perpendicular: negative reciprocal slope

given $y = 3x + 2$ and find

a line parallel to $y = 3x + 2$

that goes through $(1, -4)$

$y = 3x + 2$
 $0 = 3x + 2$
 $-2 = 3x$
 $-\frac{2}{3} = x$



Point $(1, -4)$

slope = 3

$$y - (-4) = 3(x - 1)$$

$$y = 3x - 7$$

2.2 absolute value function

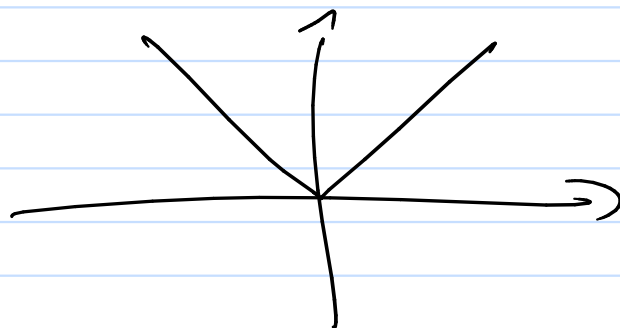
$$|-4| = 4$$

$$|0| = 0$$

$$|7/3| = 7/3$$

$$|-\pi| = \pi$$

$$|x| = \begin{cases} x & x \geq 0 \\ -x & x < 0 \end{cases}$$



(ex) $-|4x+2| = 3$

if $4x+2 \geq 0$

$$4x+2 = 3$$

$$x = \frac{1}{4}$$

if $4x+2 < 0$

$$-(4x+2) = 3$$

$$-4x - 2 = 3$$

$$-4x = 5$$

$$x = -\frac{5}{4}$$

$$\textcircled{\text{ex}} \quad -2|x+1| - 3 = -4$$

$$-2|x+1| = -1$$

$$|x+1| = \frac{1}{2}$$

$$x+1 = \frac{1}{2}$$

$$-(x+1) = \frac{1}{2}$$

$$\textcircled{\text{ex}} \quad |x+1| = -\frac{1}{2}$$

no solution