

$$f(x) = 4x - x^2$$

- ① Find the average rate of change from $x=1$ to $x=2$.
- ② " " " " " $x=1$ to $x=4$
- ③ Find the difference quotient $\frac{f(x+h) - f(x)}{h}$

$$\begin{aligned}\frac{f(x+h)-f(x)}{h} &= \frac{f(x+h)-f(x)}{(x+h)-x} \\ &= \frac{(4x+4h-x^2-2xh-h^2) - (4x-x^2)}{h} \\ &= \frac{4h - 2xh - h^2}{h} \\ &= 4 - 2x - h\end{aligned}$$

$$\textcircled{1} \begin{aligned} f(1) &= 4(1) - (1)^2 \\ &= 3 \\ f(2) &= 4(2) - (2)^2 \\ &= 4 \end{aligned}$$

$$\textcircled{2} \begin{aligned} f(1) &= 4(1) - (1)^2 = 3 \\ f(4) &= 4(4) - (4)^2 = 0 \end{aligned}$$

$$\frac{f(1) - f(4)}{1 - 4} = \frac{3 - 0}{4 - 1} = \frac{3}{-3} = \boxed{-1}$$

slope

$$\frac{f(2) - f(1)}{2 - 1} = \frac{4 - 3}{2 - 1} = \frac{1}{1} = 1$$

OR

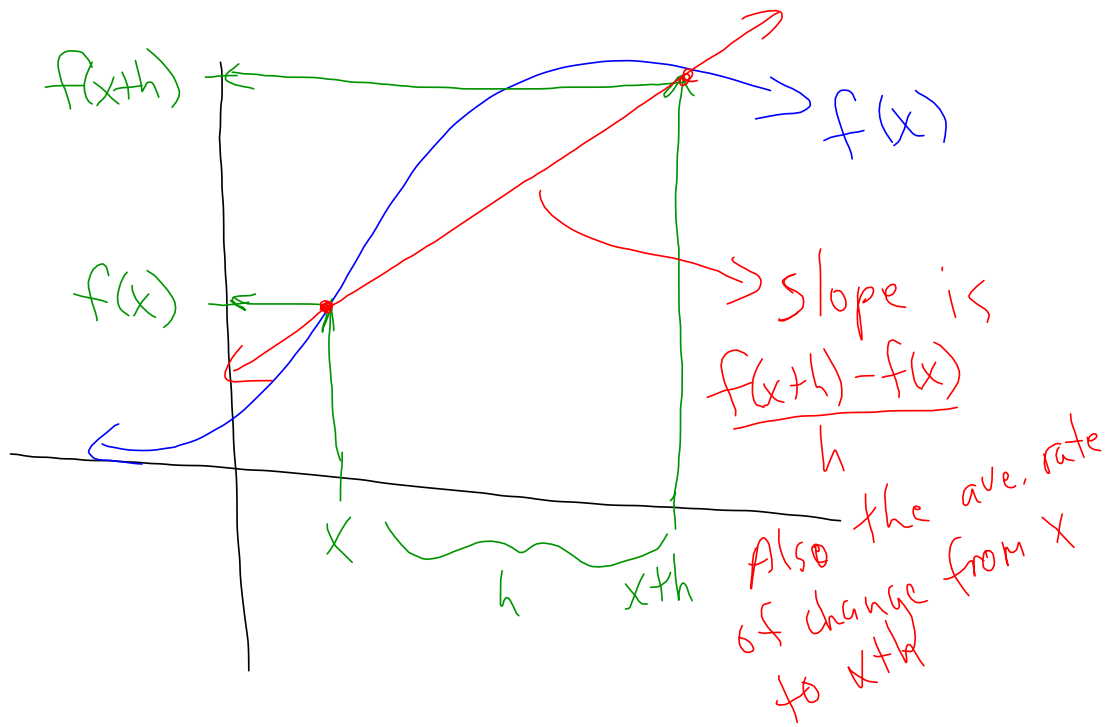
$$\frac{f(4) - f(1)}{4 - 1} = \frac{0 - 3}{4 - 1} = \frac{-3}{3} = -1$$

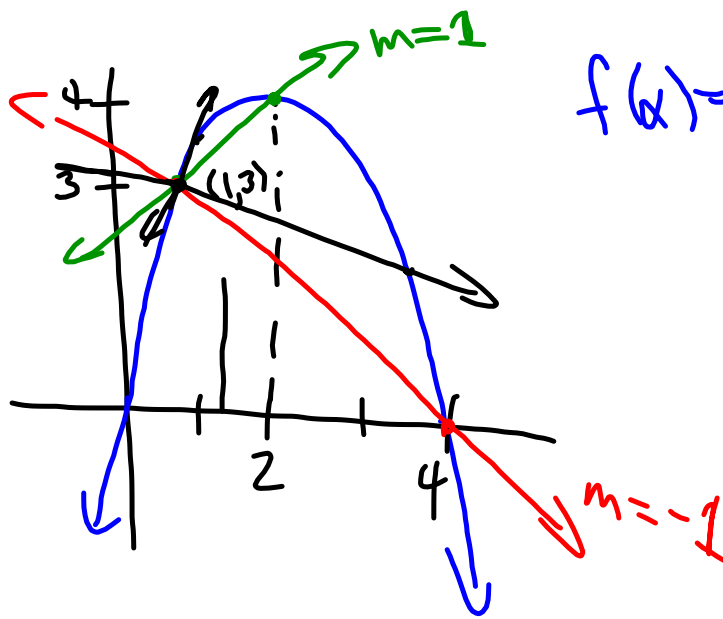
Difference quotient is $-2x - h + 4$

a) What is dg when $x=1$ and $h=1$? 1

b) " " " $x=1$ and $h=3$? -1

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





$$f(x) = 4x - x^2$$

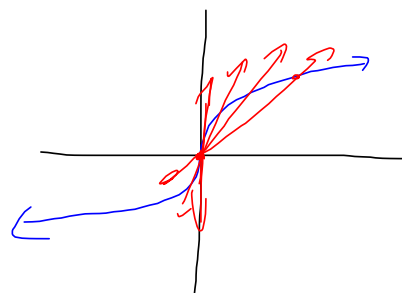
$$y = mx + b$$

$m =$ average rate of change
 $= 4 - 2x - h$

$$y = (2-h)x + b \longrightarrow y = (2-h)x + 1+h$$
$$3 = (2-h)1 \therefore b$$
$$3 - 2 + h = b$$
$$b = 1+h$$

$$f(x) = 4x - x^2$$

$$f(x) = \sqrt[3]{x}$$



$$P(x) = -0.02x^2 + 45.3x - 8300$$

$$P'(x) = -0.04x + 45.3$$

$$0 = -0.04x + 45.3$$

$$0.04x = 45.3$$

$$x = 1133$$

$$x = \frac{+45.3}{2(+0.02)}$$

