

mon
9/26/161.3 Rate of change (ROC)

$$\text{Average ROC} = \frac{\Delta y}{\Delta x} = \frac{f(b) - f(a)}{b - a}, \quad a \neq b$$

"average
rate of
change"

$$\frac{y_2 - y_1}{x_2 - x_1}$$

Find AROC of $f(x) = 3x^2$ a) from 1 to 3 $\Rightarrow [1, 3]$ on x-axis

b) from 1 to 5

$$\begin{aligned} \text{a) } f(1) &= 3(1)^2 = 3(1) = 3 \Rightarrow (1, 3) \\ f(3) &= 3(3)^2 = 3 \cdot 9 = 27 \Rightarrow (3, 27) \\ \text{AROC} &= \frac{\Delta y}{\Delta x} = \frac{27 - 3}{3 - 1} = \frac{24}{2} = 12 \end{aligned}$$

$$\begin{aligned} \text{b) } \text{AROC} &= \textcircled{18}, \quad \cancel{30}, \quad \cancel{36}, \quad \cancel{18} \quad [1, 5] \\ f(1) &= 3(1)^2 = 3 \quad (1, 3) \\ f(5) &= 3(5)^2 = 75 \quad (5, 75) \\ \text{AROC} &= \frac{75 - 3}{5 - 1} = \frac{72}{4} = 18 \end{aligned}$$

AROC is the slope of the secant line.

Finding the Egn of a Secant Line

$$g(x) = 3x^2 - 2x + 3$$

find the egn of the secant line that goes through $x = -2$ and $x = 1$

① find AROC [slope of secant line]

$$g(-2) = 3(-2)^2 - 2(-2) + 3 = 3(4) + 4 + 3 = 12 + 7 = 19$$

$$g(1) = 3(1)^2 - 2(1) + 3 = 3 - 2 + 3 = 6 - 2 = 4$$

$$m = \frac{\Delta y}{\Delta x} = \frac{19 - 4}{-2 - 1} = \frac{15}{-3} = -5$$

$$= \frac{4 - 19}{1 - (-2)} = \frac{-15}{3} = -5$$

② Use point-slope egn
 $(y - y_1) = m(x - x_1)$

$$m = -5$$

$$(1, 4)$$

$$x_1 \quad y_1$$

$$y - 4 = -5(x - 1)$$

$$y - 4 = -5x + 5$$

$$\begin{array}{r} +4 \\ \hline \end{array}$$

$$\begin{array}{r} +5 \\ \hline +4 \end{array}$$

$$\boxed{y = -5x + 9}$$

eqn of
secant line

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