

Rate of change

9/27

ES:

What are the two types of rate of change?

Average rate of change

this is the slope between two points. It is found algebraically, not using a derivative.

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

(ex)

$$f(x) = x^2 + 2$$

$$[1, 3] \\ x_1 = 1 \text{ to } x_2 = 3$$

1st Find y_1 and y_2

$$f(1) = 1^2 + 2 \\ y_1 = 3$$

$$f(3) = 3^2 + 2 \\ y_2 = 11$$

2nd Use slope formula

$$m = \frac{11 - 3}{3 - 1} = \frac{8}{2} = [4] \text{ AROC}$$

Instantaneous rate of change

this is the slope at a single point. It is found using a derivative.

$$\text{IROC} = m = f'(c)$$

(ex)

$$f(x) = x^2 + 2$$

$$[1, 3] \\ c_1 = 1 \quad c_2 = 3$$

1st find $f'(x)$

$$f'(x) = 2x$$

2nd Find
 $f'(c_1)$

$$f'(1) = 2(1) \\ = \boxed{2} \text{ IROC at } x=1$$

3rd Find
 $f'(c_2)$

$$f'(3) = 2(3) \\ = \boxed{6} \text{ IROC at } x=3$$

Summary