

Math 4 - 07 LI II: The Difference Quotient

$$\begin{aligned}\textcircled{1} \text{ARoc} &= \frac{g(4) - g(-1)}{4 - (-1)} \\ &= \frac{28 - 13}{5} \\ &= 3\end{aligned}$$

$$\begin{aligned}\textcircled{2} \text{ARoc} &= \frac{g(2) - g(-2)}{2 - (-2)} \\ &= \frac{26 - -22}{4} \\ &= 12\end{aligned}$$

$$\begin{aligned}\textcircled{3} \text{ARoc} &= \frac{[2(x+\Delta x)^2 + 3(x+\Delta x)] - (2x^2 + 3x)}{x + \Delta x - x} \\ &= \frac{2x^2 + 4x \cdot \Delta x + 2(\Delta x)^2 + 3x + 3\Delta x - 2x^2 - 3x}{\Delta x}\end{aligned}$$

$$\text{ARoc} = 4x + 2\Delta x + 3$$

$$\begin{aligned}\text{b) } x &= 2 & \text{ARoc} &= 4(2) + 2(.1) + 3 \\ \Delta x &= .1 & &= 11.2\end{aligned}$$

$$\begin{aligned}\text{c) } x &= 2 & \text{ARoc} &= 4(2) + 2(.01) + 3 \\ \Delta x &= .01 & &= 11.02\end{aligned}$$

$$\textcircled{4} h(t) = -4.9t^2 + 2t + 2$$

$$\begin{aligned}\text{a) ARoc} &= \frac{h(1+\Delta t) - h(1)}{1+\Delta t - 1} \\ &= \frac{[-4.9(1+\Delta t)^2 + 2(1+\Delta t) + 2] - [-4.9(1)^2 + 2(1) + 2]}{\Delta t} \\ &= \frac{(-4.9(1 + 2\Delta t + (\Delta t)^2) + 2(1+\Delta t) + 2) - 5.1}{\Delta t} \\ &= \frac{-4.9 - 9.8\Delta t - 4.9(\Delta t)^2 + 2 + 2\Delta t + 2 - 5.1}{\Delta t}\end{aligned}$$

$$\text{ARoc} = -4.9\Delta t - 1.8$$

$$\text{b) } \Delta t = 3\frac{1}{2} - 1 = 2\frac{1}{2}$$

$$\begin{aligned}\text{ARoc} &= -4.9(2\frac{1}{2}) - 1.8 \\ &= -14.05 \text{ m/s}\end{aligned}$$

⑤ a) C to E

$$\begin{aligned} \text{AROC} &= \frac{60-10}{30-20} \\ &= 5 \end{aligned}$$

b) $0 \leq x \leq 35$

$$\begin{aligned} \text{AROC} &= \frac{50-40}{35-0} \\ &= \frac{2}{7} \end{aligned}$$

c) $\text{AROC} = 0$ on B to D

d) $\text{AROC} = -\frac{3}{2}$ on A to C

⑥ $\text{AROC} = \frac{a-7}{9-3} = -\frac{5}{3}$

$$\frac{a-7}{6} = -\frac{5}{3} \quad \left(\frac{2}{2}\right)$$

$$\frac{a-7}{6} = \frac{-10}{6}$$

$$a-7 = -10$$

$$\underline{a = -3}$$