

$$\begin{aligned} 1) \text{ROC}_{\text{avg}} &= \frac{f(3) - f(2)}{3 - 2} \\ &= \frac{28 - 9}{1} \\ &= 19 \end{aligned}$$

$$\begin{aligned} 2) \text{ROC}_{\text{avg}} &= \frac{f(12) - f(2)}{12 - 2} \\ &= \frac{7 - 3}{10} \\ &= \frac{2}{5} \end{aligned}$$

$$\begin{aligned} 3) \text{ROC}_{\text{avg}} &= \frac{f(\pi) - f(0)}{\pi - 0} \\ &= \frac{-2}{\pi} \end{aligned}$$

$$4) f(t) = 100(1.08)^t$$

a) dollars/year

$$b) \text{ROC}_{\text{avg}} = \frac{f(0.5) - f(0)}{0.5 - 0} = 7.846$$

From time  $t=0$  to  $t=0.5$ , the amount of money in the bank account increased at a rate of \$7.85/year.

$$\begin{aligned} 5) \text{ROC}_{\text{avg}} &= \frac{f(0.5) - f(0)}{0.5 - 0} \\ &= -12.185 \end{aligned}$$

From time  $t=0$  to  $t=0.5$ , the balance in the bank account decreased at a rate of \$12.19/year

$$\begin{aligned} 6) a) \text{ROC}_{\text{avg}} &= \frac{w(5) - w(0)}{5 - 0} \\ &= \frac{175 - 145}{5} = 6 \text{ lbs/year} \end{aligned}$$

$$\begin{aligned} b) \text{ROC}_{\text{avg}} &= \frac{w(6) - w(2)}{6 - 2} \\ &= 0 \text{ lbs/year} \end{aligned}$$

$$7) a) \lim_{h \rightarrow 0} \frac{(x+h)^2 - 4(x+h) + 5 - (x^2 - 4x + 5)}{h}$$

$$\lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 - 4x - 4h + 5 - x^2 + 4x - 5}{h}$$

$$\lim_{h \rightarrow 0} \frac{2xh + h^2 - 4h}{h}$$

$$\lim_{h \rightarrow 0} \frac{h(2x + h - 4)}{h}$$

$$\lim_{h \rightarrow 0} (2x + h - 4) = 2x - 4$$

$$b) \lim_{h \rightarrow 0} \frac{4(x+h) - 7 - (4x - 7)}{h}$$

$$\lim_{h \rightarrow 0} \frac{4x + 4h - 7 - 4x + 7}{h}$$

$$\lim_{h \rightarrow 0} \frac{4h}{h} = 4$$

$$\begin{aligned} 8) \quad 2x - 4y &= 7 \\ -4y &= -2x + 7 \\ y &= \frac{1}{2}x - \frac{7}{4} \end{aligned}$$

$$\perp: y - 4 = -2(x - 2)$$

$$9) \quad f(x) = \begin{cases} x^2 + x - 3, & x \leq 2 \\ 2x + 1, & x > 2 \end{cases}$$

$$\text{I. } f(2) = 3$$

$$\text{II. } \lim_{x \rightarrow 2^-} f(x) = 3 \neq \lim_{x \rightarrow 2^+} f(x) = 5$$

$$\lim_{x \rightarrow 2} f(x) \text{ DNE}$$

$f(x)$  is not continuous at  $x = 2$