

p. 19
9c) $y = \sqrt{5x-1}$, $x=2$

$$\begin{aligned}
 m_2 &= \lim_{h \rightarrow 0} \frac{\sqrt{5(2+h)-1} - \sqrt{5(2)-1}}{h} \\
 &= \lim_{h \rightarrow 0} \frac{\sqrt{9+5h} - 3}{h} \cdot \frac{\sqrt{9+5h} + 3}{\sqrt{9+5h} + 3} \\
 &= \lim_{h \rightarrow 0} \frac{\cancel{9} + 5h - \cancel{9}}{h(\sqrt{9+5h} + 3)} \\
 &= \lim_{h \rightarrow 0} \frac{5}{\sqrt{9+5h} + 3} \\
 &= \frac{5}{6}
 \end{aligned}$$

10c) $y = \frac{1}{x+2}$, $x=3$

$$\begin{aligned}
 m_3 &= \lim_{h \rightarrow 0} \frac{\frac{1}{h+3+2} - \frac{1}{3+2}}{h} \\
 &= \lim_{h \rightarrow 0} \frac{5 - (h+5)}{5(h+5)} \cdot \frac{1}{h} \\
 &= \lim_{h \rightarrow 0} \frac{\cancel{-h}}{5(h+5)} \cdot \frac{1}{\cancel{h}} \\
 &= \frac{-1}{25}
 \end{aligned}$$

$$\#24) \quad y = -3x^3 - 2x, \quad (-1, 5)$$

$$\begin{aligned} m_{-1} &= \lim_{h \rightarrow 0} \frac{-3(h-1)^3 - 2(h-1) - 5}{h} \\ &= \lim_{h \rightarrow 0} \frac{-3(h^2 - 2h + 1)(h-1) - 2h + 2 - 5}{h} \\ &= \lim_{h \rightarrow 0} \frac{-3(h^3 - h^2 - 2h^2 + 2h + h - 1) - 2h - 3}{h} \\ &= \lim_{h \rightarrow 0} \frac{-3h^3 + 3h^2 + 6h^2 - 6h - 3h + 3 - 2h - 3}{h} \\ &= \lim_{h \rightarrow 0} \frac{-3h^3 + 9h^2 - 11h}{h} \\ &= -11 \end{aligned}$$

$$m = -11, \quad (2, 2)$$

$$\begin{aligned} y &= mx + b \\ 2 &= -11(2) + b \\ 24 &= b \end{aligned}$$

$$\therefore y = -11x + 24 \quad **$$

$$17d) \quad f(x) = x^2 - 4x + 1, \quad x = 3$$

$$m_3 = \lim_{h \rightarrow 0} \frac{(3+h)^2 - 4(3+h) + 1 + 2}{h}$$

$$= \lim_{h \rightarrow 0} \frac{\cancel{9} + \cancel{6h} + \cancel{h^2} - \cancel{12} - \cancel{4h} + \cancel{1} + \cancel{2}}{h}$$

$$= \lim_{h \rightarrow 0} 6 + h - 4$$

$$= 2$$

$$\therefore m = 2, \quad (3, -2)$$

$$\begin{aligned} y &= mx + b \\ -2 &= 2(3) + b \\ -8 &= b \end{aligned}$$

$$\therefore y = 2x - 8$$

1. Describe the **Rate of Change** graphs for the following cases. Sketches may help.

a) A function that is increasing.



b) A function that is decreasing.



c) A straight line.



d) A function with a smooth turning point.



e) A function that is increasing slower and slower.



f) A function that has a vertical asymptote.

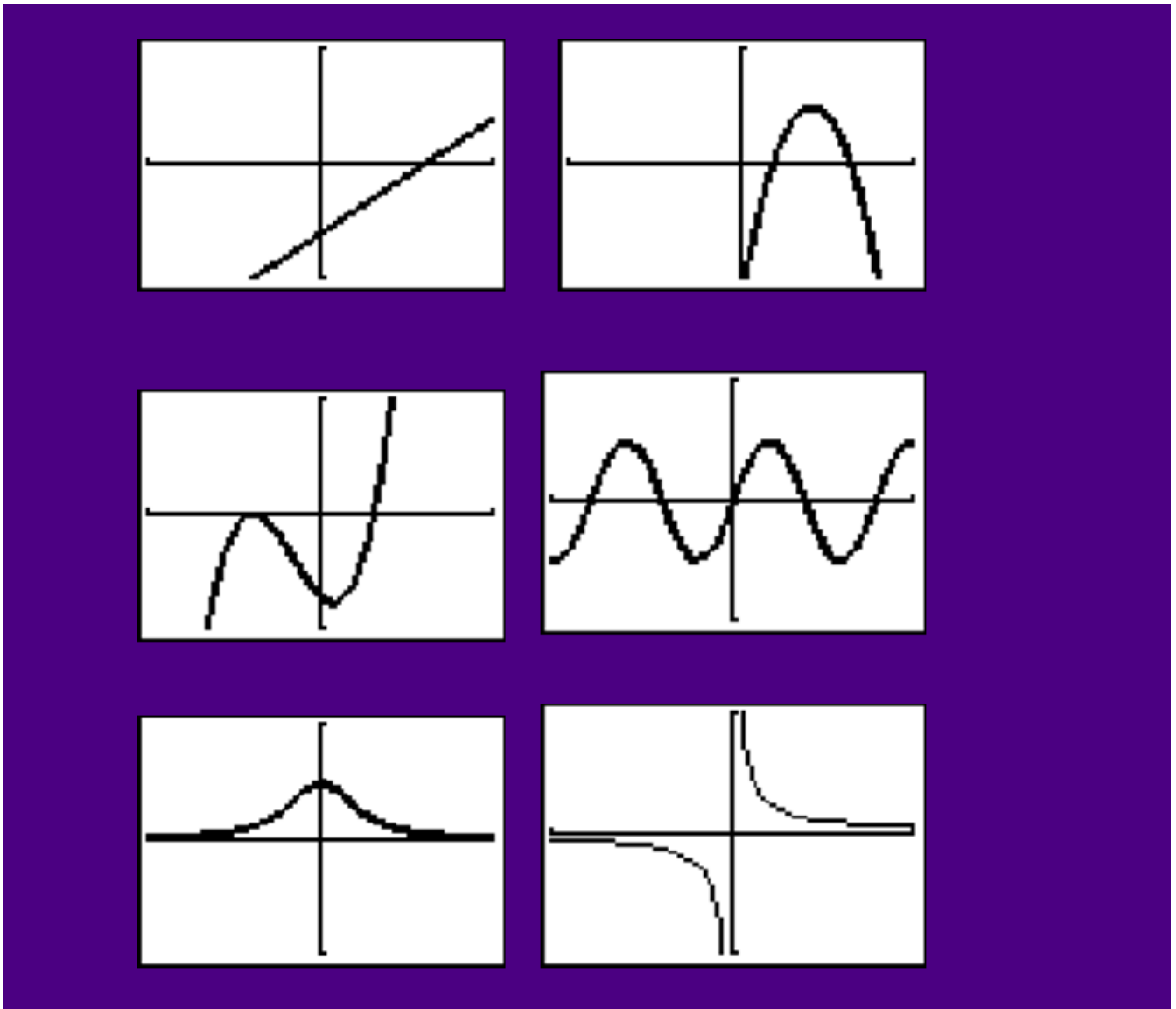


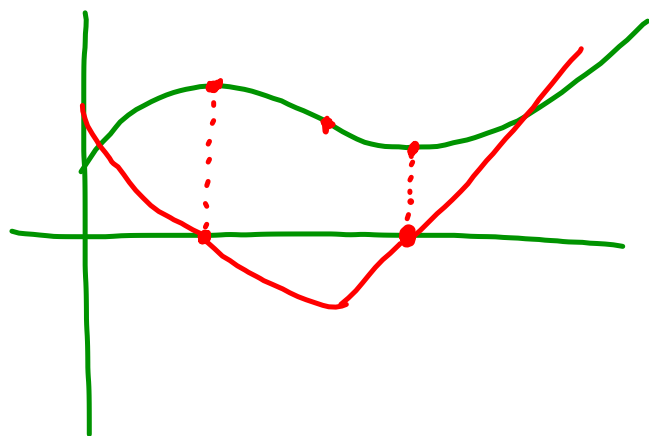
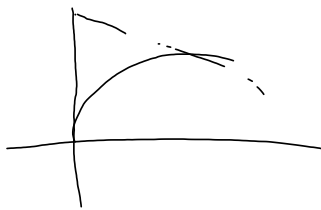
g) A periodic function.



h) A symmetric function







Attachments

Rate of Change.gsp