

A.B HW Solutions Lesson 1 [0102]

$$2.1 \# 11. \lim_{y \rightarrow -3} \frac{y^2 + 4y + 3}{y^2 - 3} = \frac{9 - 12 + 3}{9 - 3} = 0.$$

$$2.1 \# 18. \lim_{x \rightarrow 0} \frac{(4+x)^2 - 16}{x} = \lim_{x \rightarrow 0} \frac{16 + 8x + x^2 - 16}{x} = \lim_{x \rightarrow 0} 8 + x = 8$$

$$2.1 \# 19. \lim_{x \rightarrow 1} \frac{x-1}{x^2-1} = \lim_{x \rightarrow 1} \frac{x-1}{(x-1)(x+1)} = \lim_{x \rightarrow 1} \frac{1}{x+1} = \frac{1}{2}$$

$$2.1 \# 22. \lim_{x \rightarrow 0} \frac{\frac{1}{2+x} - \frac{1}{2}}{x} = \lim_{x \rightarrow 0} \frac{\frac{2}{2(2+x)} - \frac{2+x}{2(2+x)}}{x} = \lim_{x \rightarrow 0} \frac{\frac{-x}{2(2+x)}}{x}$$

$$= \lim_{x \rightarrow 0} \frac{-1}{2(2+x)} = -\frac{1}{4}$$

2.1 # 49.

$$a) \lim_{x \rightarrow 4} (g(x) + 3) = (\lim_{x \rightarrow 4} g(x) + 3) = 3 + 3 = 6$$

$$b) \lim_{x \rightarrow 4} x f(x) = \lim_{x \rightarrow 4} x \cdot \lim_{x \rightarrow 4} f(x) = 4 \cdot 0 = 0$$

$$c) \lim_{x \rightarrow 4} g^2(x) = [\lim_{x \rightarrow 4} g(x)]^2 = (3)^2 = 9$$

$$d) \lim_{x \rightarrow 4} \frac{g(x)}{f(x)-1} = \frac{\lim_{x \rightarrow 4} g(x)}{[\lim_{x \rightarrow 4} f(x) - 1]} = \frac{3}{0-1} = -3$$

$$2.1 \# 35 \quad \lim_{x \rightarrow 0^+} \frac{x}{|x|} = \lim_{x \rightarrow 0^+} 1 = 1$$

$$\frac{x}{|x|} = \begin{cases} 1 & ; x > 0 \\ -1 & ; x < 0 \end{cases}$$

$$2.1 \# 51 \quad f(x) = \begin{cases} 3-x & x < 2 \\ \frac{x}{2} + 1 & x > 2 \end{cases}$$

$$\lim_{x \rightarrow 2^+} f(x) = \lim_{x \rightarrow 2^+} \frac{x}{2} + 1 = 2$$

$$\lim_{x \rightarrow 2^-} f(x) = \lim_{x \rightarrow 2^-} 3-x = 1$$

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

$$\# 37. \quad a) \text{ TRUE } b) \text{ TRUE}$$

$$c) \text{ FALSE } d) \text{ TRUE}$$

$$e) \text{ TRUE } f) \text{ TRUE}$$

$$g) \text{ FALSE } h) \text{ FALSE}$$

$$i) \text{ FALSE } j) \text{ FALSE}$$

$$2.1 \# 62 \quad -1 \leq \cos \frac{1}{x^2} \leq 1$$

$$-x^2 \leq x^2 \cos \frac{1}{x^2} \leq x^2$$

$$\lim_{x \rightarrow 0} -x^2 = 0 \quad \lim_{x \rightarrow 0} x^2 = 0$$

$$\therefore \lim_{x \rightarrow 0} x^2 \cos \frac{1}{x^2} = 0$$

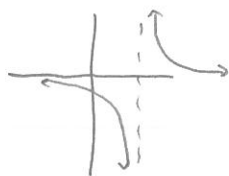
$$2.1 \# 43 \quad a) 4$$

$$b) -3$$

$$c) \text{ DNE}$$

$$d) 4$$

2.2 # 13

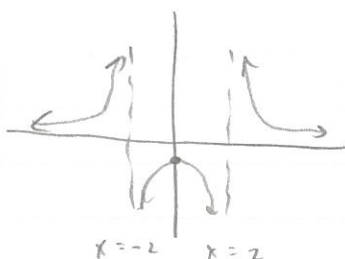


$$\lim_{x \rightarrow 2^+} \frac{1}{x-2} = \infty$$

2.2 # 14

$$\lim_{x \rightarrow 2^-} \frac{1}{x-2} = -\infty$$

2.2 # 27



$$\begin{aligned} \lim_{x \rightarrow 2^+} f(x) &= \infty \\ \lim_{x \rightarrow 2^-} f(x) &= -\infty \end{aligned}$$

$$\begin{aligned} \lim_{x \rightarrow -2^+} f(x) &= -\infty \\ \lim_{x \rightarrow -2^-} f(x) &= \infty \end{aligned}$$

2.2 # 53

$$f(x) = \begin{cases} 1/x & x < 0 \\ -1 & x \geq 0 \end{cases}$$

$$\lim_{x \rightarrow -\infty} f(x) = \lim_{x \rightarrow -\infty} \frac{1}{x} = 0$$

$$\lim_{x \rightarrow \infty} f(x) = \lim_{x \rightarrow \infty} -1 = -1$$

$$\lim_{x \rightarrow 0^-} f(x) = \lim_{x \rightarrow 0^-} \frac{1}{x} = -\infty$$

$$\lim_{x \rightarrow 0^+} f(x) = \lim_{x \rightarrow 0^+} -1 = -1$$