

Sec 2.3 day 2 page 111 (4, 15-20, 22, 33, 37, 39)

$$\begin{aligned}
 \textcircled{4} \lim_{t \rightarrow -1} (t^2 + 1)^3 (t + 3)^5 &= \left( \lim_{t \rightarrow -1} (t^2 + 1)^3 \right) \left( \lim_{t \rightarrow -1} (t + 3)^5 \right) \\
 &= \left( \lim_{t \rightarrow -1} (t^2 + 1) \right)^3 \left( \lim_{t \rightarrow -1} (t + 3) \right)^5 \\
 &= \left( \lim_{t \rightarrow -1} t^2 + \lim_{t \rightarrow -1} 1 \right)^3 \left( \lim_{t \rightarrow -1} t + \lim_{t \rightarrow -1} 3 \right)^5 \\
 &= (1 + 1)^3 (-1 + 3)^5 = 2^3 (2^5) = 2^8 = \boxed{256}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{15} \lim_{h \rightarrow 0} (4+h)^2 - 16 &= \lim_{h \rightarrow 0} 16 + 8h + h^2 - 16 \\
 &= \lim_{h \rightarrow 0} h(8+h) = \textcircled{8}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{16} \lim_{h \rightarrow 0} (2+h)^3 - 8 &= \lim_{h \rightarrow 0} 8 + 3(4h) + 3(2h^2) + h^3 - 8 \\
 \lim_{h \rightarrow 0} \frac{12h + 6h^2 + h^3}{h} &= \lim_{h \rightarrow 0} 12 + 6h + h^2 = \textcircled{12}
 \end{aligned}$$

$$\begin{aligned}
 \textcircled{17} \lim_{x \rightarrow -2} \frac{x+2}{x^3+8} &= \lim_{x \rightarrow -2} \frac{x+2}{(x+2)(x^2-2x+4)} \\
 \lim_{x \rightarrow -2} \frac{1}{x^2-2x+4} &= \textcircled{\frac{1}{12}}
 \end{aligned}$$

$$\begin{array}{r}
 x^2 - 2x + 4 \\
 x+2 \overline{) x^3 + 8} \\
 \underline{x^3 + 2x^2} \phantom{+ 8} \\
 -2x^2 \phantom{+ 8} \\
 \underline{-2x^2 + 4x} \phantom{+ 8} \\
 +4x + 8
 \end{array}$$

$$\textcircled{18} \lim_{h \rightarrow 0} \frac{\sqrt{1+h} - 1}{h} \cdot \frac{(\sqrt{1+h} + 1)}{(\sqrt{1+h} + 1)}$$

$$= \lim_{h \rightarrow 0} \frac{1+h-1}{h(\sqrt{1+h} + 1)} = \lim_{h \rightarrow 0} \frac{1}{\sqrt{1+h} + 1} = \frac{1}{2}$$

$$\textcircled{19} \lim_{x \rightarrow -4} \frac{\frac{1}{4} + \frac{1}{x}}{4+x} = \lim_{x \rightarrow -4} \frac{\frac{x+4}{4x}}{4+x} = \lim_{x \rightarrow -4} \frac{1}{4x} = \frac{-1}{16}$$

$$\textcircled{20} \lim_{x \rightarrow -1} \frac{x^2 + 2x + 1}{x^4 - 1} = \lim_{x \rightarrow -1} \frac{(x+1)(x+1)}{(x^2-1)(x^2+1)}$$

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

$$\textcircled{22} \lim_{t \rightarrow 0} \left( \frac{1}{t} - \frac{1}{t^2+t} \right) = \lim_{t \rightarrow 0} \left( \frac{1}{t} - \frac{1}{t(t+1)} \right)$$

$$= \lim_{t \rightarrow 0} \frac{t+1-1}{t(t+1)} = \frac{t}{t(t+1)} = \frac{1}{t+1} = \frac{1}{1} = 1$$

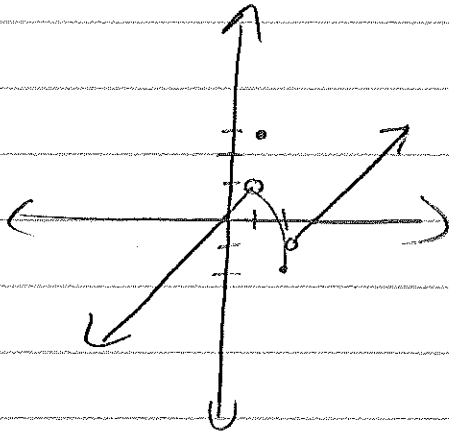
$$\textcircled{33} \lim_{x \rightarrow 3} (2x + |x-3|) \Rightarrow \lim_{x \rightarrow 3^-} (2x - (x-3)) = 6 - 0 = 6$$

$$\lim_{x \rightarrow 3^+} (2x + x - 3) = 6 \quad \therefore \lim_{x \rightarrow 3} (2x + |x-3|) = 6$$

37) a) i) 1    ii) 1    iii)  $g(1) = 3$

iv) -2    v) -1    vi) DNE

b)



39) a) i) -2    ii) DNE    iii) -3

b) i)  $n-1$     ii)  $n$

c) all  $\mathbb{R}$  except integers.