

2.5# 1, 3, 5, 7, 15, 21, 25, 27, 31, 35, 39, 45, 49 & 53

$$\begin{aligned}
 1) \lim_{x \rightarrow 6} \frac{x^2 - 36}{x - 6} &= \frac{(6)^2 - 36}{6 - 6} = \frac{0}{0} \text{ Form} \\
 &= \lim_{x \rightarrow 6} \frac{(x-6)(x+6)}{(x-6)} \\
 &= \lim_{x \rightarrow 6} x + 6 \\
 &= 6 + 6 \\
 &= 12
 \end{aligned}$$

$$\begin{aligned}
 3) \lim_{x \rightarrow -1} \frac{x^2 + 2x + 1}{x + 1} &= \frac{(-1)^2 + 2(-1) + 1}{-1 + 1} = \frac{0}{0} \text{ Form} \\
 &= \lim_{x \rightarrow -1} \frac{(x+1)(x+1)}{(x+1)} \\
 &= \lim_{x \rightarrow -1} x + 1 \\
 &= (-1) + 1 \\
 &= 0
 \end{aligned}$$

$$\begin{aligned}
 5) \lim_{x \rightarrow 7} \frac{x-7}{x^2 - 49} &= \lim_{x \rightarrow 7} \frac{(x-7)}{(x-7)(x+7)} \\
 &= \lim_{x \rightarrow 7} \frac{1}{x+7} \\
 &= \frac{1}{7+7} \\
 &= \frac{1}{14}
 \end{aligned}$$

$$\begin{aligned}
 7) \lim_{x \rightarrow -2} \frac{x^2 + 3x + 2}{x + 2} &= \lim_{x \rightarrow -2} \frac{(x+1)(x+2)}{(x+2)} \\
 &= \lim_{x \rightarrow -2} x + 1 \\
 &= (-2) + 1 \\
 &= -1
 \end{aligned}$$

$$\begin{aligned}
 15) \lim_{t \rightarrow 0} \frac{4^{2t} - 1}{4^t - 1} &= \lim_{t \rightarrow 0} \frac{(4^t - 1)(4^t + 1)}{(4^t - 1)} \\
 &= \lim_{t \rightarrow 0} 4^t + 1 \\
 &= 4^0 + 1 \\
 &= 1 + 1 \\
 &= 2
 \end{aligned}$$

21) $\lim_{h \rightarrow 0} \frac{\sqrt{2+h} - 2}{h}$ Does not exist.

Odd V.A @ $h=0$.

$$\lim_{h \rightarrow 0^+} \frac{\sqrt{2+h} - 2}{h} = -\infty$$

$$\lim_{h \rightarrow 0^-} \frac{\sqrt{2+h} - 2}{h} = \infty$$

$$\begin{aligned}
 25) \lim_{x \rightarrow 4} \left(\frac{1}{\sqrt{x}-2} - \frac{4}{x-4} \right) \\
 &= \lim_{x \rightarrow 4} \left(\frac{1}{\sqrt{x}-2} \cdot \frac{(\sqrt{x}+2)}{(\sqrt{x}+2)} - \frac{4}{x-4} \right) \\
 &= \lim_{x \rightarrow 4} \left(\frac{\sqrt{x}+2}{x-4} - \frac{4}{x-4} \right) \\
 &= \lim_{x \rightarrow 4} \frac{\sqrt{x}-2}{x-4} \cdot \frac{(\sqrt{x}+2)}{(\sqrt{x}+2)} \\
 &= \lim_{x \rightarrow 4} \frac{(x-4)}{(x-4)(\sqrt{x}+2)} \\
 &= \lim_{x \rightarrow 4} \frac{1}{\sqrt{x}+2} \\
 &= \frac{1}{\sqrt{4}+2} \\
 &= \frac{1}{2+2} \\
 &= \frac{1}{4}
 \end{aligned}$$

$$\begin{aligned}
 27) \lim_{x \rightarrow 0} \frac{\cot(x)}{\csc(x)} &= \lim_{x \rightarrow 0} \frac{\frac{\cos(x)}{\sin(x)}}{\frac{1}{\sin(x)}} \\
 &= \lim_{x \rightarrow 0} \frac{\cos(x)}{\sin(x)} \cdot \sin(x) \\
 &= \lim_{x \rightarrow 0} \cos(x) \\
 &= \cos(0) \\
 &= 1
 \end{aligned}$$

$$\begin{aligned}
 31) \lim_{x \rightarrow \pi/4} \frac{\sin(x) - \cos(x)}{\tan(x) - 1} \\
 &= \lim_{x \rightarrow \pi/4} \frac{(\sin(x) - \cos(x))}{\frac{\sin(x)}{\cos(x)} - \frac{\cos(x)}{\cos(x)}} \\
 &= \lim_{x \rightarrow \pi/4} \frac{(\sin(x) - \cos(x))}{\frac{(\sin(x) - \cos(x))}{\cos(x)}} \\
 &= \lim_{x \rightarrow \pi/4} (\sin(x) - \cos(x)) \cdot \frac{\cos(x)}{(\sin(x) - \cos(x))} \\
 &= \lim_{x \rightarrow \pi/4} \cos(x) \\
 &= \cos(\pi/4) \\
 &= \frac{\sqrt{2}}{2}
 \end{aligned}$$

