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

1) $\lim_{x\to 6} \frac{x^2-36}{x-6}$ $\quad \frac{(6)^2-36}{6-6} = \frac{0}{0}$ Form

$= \lim_{x\to 6} \frac{(x-6)(x+6)}{(x-6)}$

$= \lim_{x\to 6} x+6$

$= 6+6$

$= 12$

3) $\lim_{x\to -1} \frac{x^2+2x+1}{x+1}$ $\quad \frac{(-1)^2+2(-1)+1}{-1+1} = \frac{0}{0}$ Form

$= \lim_{x\to -1} \frac{(x+1)(x+1)}{(x+1)}$

$= \lim_{x\to -1} x+1$

$= (-1)+1$

$= 0$

5) $\lim_{x\to 7} \frac{x-7}{x^2-49} = \lim_{x\to 7} \frac{(x-7)}{(x-7)(x+7)}$

$= \lim_{x\to 7} \frac{1}{x+7}$

$= \frac{1}{7+7}$

$= \frac{1}{14}$

7) $\lim_{x\to -2} \frac{x^2+3x+2}{x+2} = \lim_{x\to -2} \frac{(x+1)(x+2)}{(x+2)}$

$= \lim_{x\to -2} x+1$

$= (-2)+1$

$= -1$

15) $\lim_{t\to 0} \frac{4^{2t}-1}{4^t-1} = \lim_{t\to 0} \frac{(4^t-1)(4^t+1)}{(4^t-1)}$

$= \lim_{t\to 0} 4^t+1$

$= 4^0+1$

$= 1+1$

$= 2$

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

Odd V.A @ $h=0$.

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

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

25) $\lim_{x\to 4} \left(\frac{1}{\sqrt{x}-2} - \frac{4}{x-4}\right)$

$= \lim_{x\to 4} \left(\frac{1}{\sqrt{x}-2} \cdot \left(\frac{\sqrt{x}+2}{\sqrt{x}+2}\right) - \frac{4}{x-4}\right)$

$= \lim_{x\to 4} \left(\frac{\sqrt{x}+2}{x-4} - \frac{4}{x-4}\right)$

$= \lim_{x\to 4} \frac{\sqrt{x}-2}{x-4} \cdot \left(\frac{\sqrt{x}+2}{\sqrt{x}+2}\right)$

$= \lim_{x\to 4} \frac{(x-4)}{(x-4)(\sqrt{x}+2)}$

$= \lim_{x\to 4} \frac{1}{\sqrt{x}+2}$

$= \frac{1}{\sqrt{4}+2}$

$= \frac{1}{2+2}$

$= \frac{1}{4}$

27) $\lim_{x\to 0} \frac{\cot(x)}{\csc(x)} = \lim_{x\to 0} \frac{\left(\frac{\cos(x)}{\sin(x)}\right)}{\left(\frac{1}{\sin(x)}\right)}$

$= \lim_{x\to 0} \left(\frac{\cos(x)}{\sin(x)}\right) \cdot \sin(x)$

$= \lim_{x\to 0} \cos(x)$

$= \cos(0)$

$= 1$

31) $\lim_{x\to \pi/4} \frac{\sin(x)-\cos(x)}{\tan(x)-1}$

$= \lim_{x\to \pi/4} \frac{(\sin(x)-\cos(x))}{\frac{\sin(x)}{\cos(x)} - \frac{\cos(x)}{\cos(x)}}$

$= \lim_{x\to \pi/4} \frac{(\sin(x)-\cos(x))}{\frac{(\sin(x)-\cos(x))}{\cos(x)}}$

$= \lim_{x\to \pi/4} (\sin(x)-\cos(x)) \left(\frac{\cos(x)}{\sin(x)-\cos(x)}\right)$

$= \lim_{x\to \pi/4} \cos(x)$

$= \cos(\pi/4)$

$= \frac{\sqrt{2}}{2}$