

TUGAS KALKULUS 3

Georgia Sugisandhea - kelas C - 535230080

$$1. \lim_{x \rightarrow 2} \frac{x^2 - 5x + 6}{x^2 - 3x + 2} \begin{matrix} \rightarrow 6 = -3 \cdot -2 \\ \rightarrow -5 = -3 - 2 \\ \rightarrow 2 = -2 \cdot -1 \\ \rightarrow -3 = -2 - 1 \end{matrix} = \lim_{x \rightarrow 2} \frac{(x-3)(x-2)}{(x-2)(x-1)} = \lim_{x \rightarrow 2} \frac{(x-3)}{(x-1)} = \frac{2-3}{2-1} = \frac{-1}{1} = -1$$

$$2. \lim_{x \rightarrow 4} \frac{\sqrt{x+5} - \sqrt{2x+1}}{x-4} = \lim_{x \rightarrow 4} \frac{\sqrt{x+5} - \sqrt{2x+1}}{x-4} \cdot \frac{\sqrt{x+5} + \sqrt{2x+1}}{\sqrt{x+5} + \sqrt{2x+1}}$$

$$= \lim_{x \rightarrow 4} \frac{(x+5) - (2x+1)}{(x-4)(\sqrt{x+5} + \sqrt{2x+1})} = \lim_{x \rightarrow 4} \frac{-x+4}{(x-4)(\sqrt{x+5} + \sqrt{2x+1})}$$

$$= \lim_{x \rightarrow 4} \frac{-(x-4)}{(x-4)(\sqrt{x+5} + \sqrt{2x+1})}$$

$$= \frac{-1}{\sqrt{4+5} + \sqrt{8+1}} = \frac{-1}{\sqrt{9} + \sqrt{9}} = \frac{-1}{3+3} = \frac{-1}{6}$$

$$3. \lim_{x \rightarrow 3} \frac{x^2 - x - 6}{4 - \sqrt{5x+1}} = \lim_{x \rightarrow 3} \frac{x^2 - x - 6}{4 - \sqrt{5x+1}} \cdot \frac{4 + \sqrt{5x+1}}{4 + \sqrt{5x+1}}$$

$$x^2 - x - 6 \leftarrow \begin{matrix} -6 = -3 \cdot 2 \\ -1 = -3 + 2 \end{matrix}$$

$$= \lim_{x \rightarrow 3} \frac{x^2 - x - 6 \cdot (4 + \sqrt{5x+1})}{16 - 5x - 1}$$

$$= \lim_{x \rightarrow 3} \frac{(x-3)(x+2)(4 + \sqrt{5x+1})}{15 - 5x - 1}$$

$$= \lim_{x \rightarrow 3} \frac{(x-3)(x+2)(4 + \sqrt{5x+1})}{5(3-x)}$$

$$= \lim_{x \rightarrow 3} \frac{-(x+2)(4 + \sqrt{5x+1})}{5}$$

$$\rightarrow \frac{-(3+2)(4 + \sqrt{15+1})}{5}$$

$$\frac{-5(4 + \sqrt{16})}{5} = -(4+4)$$

$$= -8$$



Georgia Sugisandhea - kelas C - 535230080

$$\rightarrow \sin^2 a + \cos^2 a = 1 \rightarrow \sin^2 a = 1 - \cos^2 a$$

$$\begin{aligned} 4. \lim_{x \rightarrow 2} \frac{1 - \cos^2(x-2)}{3x^2 - 12x + 12} &= \lim_{x \rightarrow 2} \frac{\sin^2(x-2)}{3x^2 - 12x + 12} \quad \begin{matrix} 36 = -6 \cdot -6 \\ -12 = -6 \cdot 2 \end{matrix} \\ &= \lim_{x \rightarrow 2} \frac{\sin^2(x-2)}{\frac{1}{3}(3x-6)(3x-6)} \\ &= \lim_{x \rightarrow 2} \frac{\sin^2(x-2)}{(x-2)(3x-6)} = \lim_{x \rightarrow 2} \frac{\overset{=1}{\sin(x-2)} \sin(x-2)}{(x-2)(3x-6)} \\ &= \lim_{x \rightarrow 2} 1 \cdot \frac{\sin(x-2)}{(3x-6)} \\ &= \lim_{x \rightarrow 2} \frac{\sin(x-2)}{3(x-2)} = 1 \\ &= \lim_{x \rightarrow 2} 1 \cdot \frac{1}{3} = \frac{1}{3} // \end{aligned}$$

$$\begin{aligned} 5. \lim_{x \rightarrow \infty} \frac{(3x-1) - \sqrt{9x^2 - 11x + 9}}{(3x-1) + \sqrt{9x^2 - 11x + 9}} &= \lim_{x \rightarrow \infty} \frac{(3x-1) - \sqrt{9x^2 - 11x + 9}}{(3x-1) + \sqrt{9x^2 - 11x + 9}} \cdot \frac{(3x-1) + \sqrt{9x^2 - 11x + 9}}{(3x-1) + \sqrt{9x^2 - 11x + 9}} \\ &= \lim_{x \rightarrow \infty} \frac{(3x-1)^2 - (9x^2 - 11x + 9)}{(3x-1) + \sqrt{9x^2 - 11x + 9}} \\ &= \lim_{x \rightarrow \infty} \frac{9x^2 - 6x + 1 - 9x^2 + 11x - 9}{(3x-1) + \sqrt{9x^2 - 11x + 9}} \\ &= \lim_{x \rightarrow \infty} \frac{5x - 8}{(3x-1) + \sqrt{9x^2 - 11x + 9}} \cdot \frac{x}{x} \\ &= \lim_{x \rightarrow \infty} \frac{\frac{5x}{x} - \frac{8}{x}}{\frac{3x}{x} - \frac{1}{x} + \sqrt{\frac{9x^2}{x^2} - \frac{11x}{x^2} + \frac{9}{x^2}}} \\ &= \lim_{x \rightarrow \infty} \frac{5 - \frac{8}{x}}{3 - \frac{1}{x} + \sqrt{9 - \frac{11}{x} + \frac{9}{x^2}}} \\ &= \frac{5 - 0}{3 - 0 + \sqrt{9 - 0 + 0}} = \frac{5}{3 + 3} = \frac{5}{6} // \end{aligned}$$