

PEMBAHASAN TF 4

1. Jika disubstitusi langsung, jawabannya $\frac{0}{0}$. Gunakan metode L'Hopital'

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

2. Jika $f(4) \neq 0$, maka hasil limit di soal bukan -4 . Nilai $f(4) = 0$, sehingga $4a = b$. Setelah disubstitusi $x = 4$ hasilnya $\frac{0}{0}$. Gunakan metode L'Hopital.

$$-4 = \lim_{x \rightarrow 4} \frac{f(x)}{\sqrt{x} - 2} = \lim_{x \rightarrow 4} \frac{a}{\frac{1}{2}x^{-\frac{1}{2}}} = 4a$$

Nilai $a = -1$ dan $b = -4$. Nilai $f(1) = -1(1) - (-4) = 3$.

3. Ini penjabarannya

$$\begin{aligned}\lim_{x \rightarrow \infty} \left(\sqrt{81x^2 - 10x + 3} - 9x + 1 \right) &= \lim_{x \rightarrow \infty} \left(\sqrt{81x^2 - 10x + 3} - (9x - 1) \right) \\ &= \lim_{x \rightarrow \infty} \left(\sqrt{81x^2 - 10x + 3} - \sqrt{81x^2 - 18x + 1} \right) \\ &= \frac{-10 - (-18)}{2\sqrt{81}} \\ &= \frac{4}{9}\end{aligned}$$

4. Misalkan $y = \frac{1}{x}$. Jika $x \rightarrow \infty$, maka $y \rightarrow 0$.

$$\begin{aligned}\lim_{x \rightarrow \infty} \frac{\sin\left(\frac{3}{x}\right)}{\left(1 - \cos\left(\frac{2}{x}\right)\right) x^2 \sin\left(\frac{1}{x}\right)} &= \lim_{y \rightarrow 0} \frac{\sin(3y)}{\left(1 - \cos(2y)\right) \frac{1}{y^2} \sin(y)} \\ &= \lim_{y \rightarrow 0} \frac{y^2 \sin(3y)}{\left(1 - \cos(2y)\right) \sin(y)} \\ &= \lim_{y \rightarrow 0} \frac{y^2 \sin(3y)}{\left(2 \sin^2(y)\right) \sin(y)} \quad \text{ingat } \cos(2y) = 1 - 2 \sin^2(y) \\ &= \frac{3}{2}\end{aligned}$$