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$$\lim_{x \rightarrow 0} \frac{\int_0^x \sqrt{1 + \cos t} dt}{x}$$

Solusi

Perhatikan bahwa $\cos t = 2 \cos^2 \frac{t}{2} - 1$. Maka,

$$\begin{aligned} \int_0^x \sqrt{1 + \cos t} dt &= \sqrt{2} \int_0^x \cos \frac{t}{2} dt \\ &= \sqrt{2} \left[2 \sin \frac{t}{2} \right]_0^x = 2\sqrt{2} \sin \frac{x}{2} \end{aligned}$$

Maka,

$$\lim_{x \rightarrow 0} \frac{2\sqrt{2} \sin \frac{x}{2}}{x} = 2\sqrt{2} \cdot \frac{1}{2} = \sqrt{2}$$