## Answer on Question #47128 – Math – Calculus

**Question.**

Find the length of the curve $y = \log secx$ between the points $x = 0$ and $x = \frac{\pi}{3}$.

**Solution.**

We shall use the next formula: $L = \int_0^{\frac{\pi}{3}} \sqrt{1 + \left(y'(x)\right)^2}\, dx$.

$y'(x) = \left(\log \frac{1}{cosx}\right)' = cosx \cdot \left(-\frac{-sinx}{cos^2 x}\right) = \frac{sinx}{cosx}$.

$L = \int_0^{\frac{\pi}{3}} \sqrt{1 + \frac{sin^2 x}{cos^2 x}}\, dx = \int_0^{\frac{\pi}{3}} \sqrt{\frac{1}{cos^2 x}}\, dx = \int_0^{\frac{\pi}{3}} \frac{dx}{cosx} = \int_0^{\frac{\pi}{3}} \frac{cosx}{cos^2 x}\, dx = \int_0^{\frac{\pi}{3}} \frac{d(sinx)}{1 - sin^2 x} =$

$= -\frac{1}{2}\log\left|\frac{sinx-1}{sinx+1}\right| \Big|_0^{\frac{\pi}{3}} = -\frac{1}{2}\log\left|\frac{\sqrt{3}/2-1}{\sqrt{3}/2+1}\right| = \log\left(\sqrt{3}+2\right).$

**Answer.** $\log\left(\sqrt{3}+2\right)$