

Calculus Study Guide: 8.1

Calculate the arc length of the function on the given interval.

$y = \ln(\sin x), [\pi/6, \pi/3]$

$$\frac{dy}{dx} = \frac{1}{\sin x} \cdot \cos x = \cot x$$

$$\int_{\pi/6}^{\pi/3} \sqrt{1 + \cot^2 x} = 0.767$$

arc length: _____

Estimate the path length of $g(x) = \cos x$ on the interval $[0, \pi/2]$. Use 4 trapezoids to calculate the estimate.

$$g'(x) = -\sin x$$

$$g'(x)^2 = \sin^2 x$$

$$\int_0^{\pi/2} \sqrt{1 + \sin^2 x} dx$$

0

$$\text{width} = \frac{\pi/2}{4} = \pi/8$$

$$\frac{\pi}{8} \cdot \frac{1}{2} \left(\sqrt{1 + \sin^2 0} + 2 \sqrt{1 + \sin^2 \pi/8} + 2 \sqrt{1 + \sin^2 \pi/4} + 2 \sqrt{1 + \sin^2 3\pi/8} + \sqrt{1 + \sin^2 \pi/2} \right) = 1.910$$

Path length \approx _____