Math16600 Section 23715 Quiz 7
Fall 2023, October 19

Name: [1 pt]

Problem 1: Set up an integral for evaluating the arc length of the function $y = \sin x$ with $0 \le x \le \pi/2$. You don't have to evaluate the integral! [5 pts]

$$L = \int_0^{\frac{\pi}{2}} \sqrt{1 + \left(\frac{dy}{dx}\right)^2}\, dx$$

$$y = \sin x \quad \Rightarrow \quad \frac{dy}{dx} = \cos x$$

$$\Rightarrow \quad L = \int_0^{\pi/2} \sqrt{1 + \cos^2 x}\, dx$$

Problem 2: Set up an integral to find area of the surface obtained by rotating the curve $y = \tan x$, $0 \le x \le \pi/4$ about the y-axis. You don't have to evaluate the integral! [5 pts]

$$A = \int_0^{\pi/4} 2\pi x \sqrt{1 + \left(\frac{dy}{dx}\right)^2}\, dx$$

$$y = \tan x \quad \Rightarrow \quad \frac{dy}{dx} = \sec^2 x$$

$$\Rightarrow \quad A = \int_0^{\frac{\pi}{4}} 2\pi x \sqrt{1 + \sec^4 x}\, dx$$