Calculus 1 Quiz 2

SOLUTIONS

Show details in the space next to each problem.
You must show your work to receive full credit.

1. Compute the length of the curve $y = \ln(\cos x)$ for $0 \leq x \leq \frac{\pi}{4}$. Solution: We have

$$y' = \frac{-1}{\cos x} \sin x = -\tan x$$

(chain rule!!) hence

$$L = \int_0^{\frac{\pi}{4}} \sqrt{1 + \tan^2 x} = \int_0^{\frac{\pi}{4}} \sqrt{\sec^2 x}$$

$$= \int_0^{\frac{\pi}{4}} \sec x \, dx$$

$$= \left[ \ln |\tan x + \sec x| \right]_0^{\frac{\pi}{4}}$$

$$= \ln(1 + \sqrt{2}) - \ln 1 = \ln(1 + \sqrt{2})$$

2. Compute the following integral:

$$\int x \sec x \tan x \, dx$$

Solution: Integrate by part with $u = x$, $dv = \sec x \tan x$ so that $du = 1$ and $v = \sec x$ so we get

$$\int x \sec x \tan x \, dx = x \sec x - \int \sec x \, dx = x \sec x - \ln |\sec x + \tan x| + C$$