3]

$$L = \int_a^b \sqrt{(x')^2 + (y')^2}\, dt$$

$$= \int_0^{\pi/4} \sqrt{1^2 + \left(\frac{-\sin(t)}{\cos(t)}\right)^2}\, dt$$

$$= \int_0^{\pi/4} \sqrt{1 + \tan^2 t}\, dt$$

$$= \int_0^{\pi/4} \sqrt{\sec^2 t}\, dt$$

note: on the interval $0 \le t \le \frac{\pi}{4}$, $\sec(t)$ is positive

$$= \int_0^{\pi/4} \sec t\, dt$$

$$= \ln|\sec t + \tan t|\Big|_0^{\pi/4}$$

$$= \ln\left|\sec\left(\frac{\pi}{4}\right) + \tan\left(\frac{\pi}{4}\right)\right| - \ln|\sec(0) + \tan(0)|$$

$$= \ln\left(\sqrt{2} + 1\right) - \ln(1 + 0) = \ln\left(1 + \sqrt{2}\right)$$