

A.

$$\begin{aligned} \text{speed} &= \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} \\ &= \sqrt{\left(\arctan\left(\frac{t}{1+t}\right)\right)^2 + \left(\ln(t^2 + 1)\right)^2} \Bigg|_{t=4} \\ &= 2.912 \end{aligned}$$

B.

$$\begin{aligned} \text{Distance traveled} &= \int_0^4 \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} dt \\ &= \int_0^4 \sqrt{\left(\arctan\left(\frac{t}{1+t}\right)\right)^2 + \left(\ln(t^2 + 1)\right)^2} dt \\ &= 11.649 \text{ or } 11.650 \end{aligned}$$

$$c. \quad x(4) = -3 + \int_0^4 \arctan\left(\frac{t}{1+t}\right) dt = -.301$$

$$D. \quad \text{Slope of the tangent line is } \frac{dy/dt}{dx/dt} = 2$$

This occurs at $t = .378$

$$\left\langle \frac{d^2x}{dt^2}, \frac{d^2y}{dt^2} \right\rangle \Bigg|_{t=4} = \langle .0243, .470 \rangle$$

