BC CalcLog 5.4

An object moving along a curve in the xy-plane is at position $\left(x(t), y(t)\right)$ at time t with

$$\frac{dx}{dt} = \arctan\left(\frac{t}{t+1}\right) \text{ and } \frac{dy}{dt} = \ln\left(t^2+1\right)$$

for $t \geq 0$. At time $t = 0$, the object is at position (-3, -4).

(a) Find the speed of the object at time $t = 4$.

(b) Find the total distance traveled by the object over the time interval $0 \leq t \leq 4$.

(c) Find $x(4)$.

(d) For $t > 0$, there is a point on the curve where the line tangent to the curve has slope 2. At what time t is the object at this point? Find the acceleration vector at this point.