Vector Functions and Curves
One variable functions

Question
A particle moves along the curve $y = 3/x$, travelling to the right. At the point $(2, \frac{3}{2})$ its speed is 10, what is its velocity?
Answer
When its x-coordinate is x, the object is at position

$$\underline{r} = x\underline{i} + (3/x)\underline{j}$$

, and it and velocity and speed

$$\underline{v} = \frac{d\underline{r}}{dt} = \frac{dx}{dt}\underline{i} - \frac{3}{x^2}\frac{dx}{dt}\underline{j}$$

$$v = \left|\frac{dx}{dt}\right| \sqrt{1 + \frac{9}{x^4}}$$

It is known that dx/dt¿0 since the particle is moving to the right.
When $x = 2$, we have

$$\begin{aligned} 10 = v &= (dx/dt)\sqrt{1 + (9/16)} \\ &= (5/4)(dx/dt) \end{aligned}$$

$\Rightarrow dx/dt = 8$