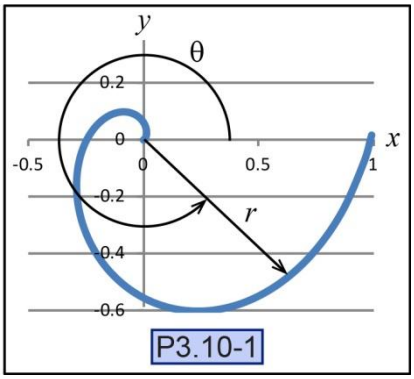
P3.10-1) A particle's motion is defined by the equation $cr = \theta^2$ as shown in the graph, where r is in meters and $c = 40$ 1/m. If the particle is traveling with constant angular velocity ($\dot{\theta} = 2$ rad/s), determine the particle's velocity and acceleration as a function of θ.



P3.10-1

Given:

Find:

Solution:

Derive the particle's velocity as a function of θ.

Write down the velocity equation in terms of polar coordinates.

v = _____

Write down the equation for r as a function of θ?

r = _____

What is the first derivative of r with respect to time?

$\dot{r}$ = _____

What is the particle's velocity as a function of θ?

v = _____

Derive the particle's acceleration as a function of θ.

Write down the acceleration equation in terms of polar coordinates.

a = _____

What is the second derivative of r with respect to time?

$\ddot{r}$ = _____

What is the particle's acceleration as a function of θ?

a = _____

Remember your units!