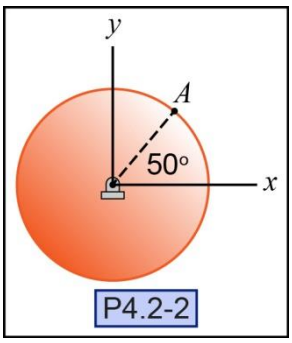
P4.2-2) A circular disk of radius 0.2 m rotates about its center. The acceleration of point A on the rim of the disk is $\mathbf{a} = 5\mathbf{i} - 7\mathbf{j}$ m/s^2. Determine the angular velocity and angular acceleration of the disk at this instant.



P4.2-2

Given:

Find:

Solution:

Coordinate Transformation

In addition to the x-y coordinate system what other system will help you solve this problem?

n-t coordinates r-θ coordinates

Acceleration

Express the acceleration of point A in terms of the above coordinate system and the variables that we wish to solve for.

$\mathbf{a}_A$ = _____

Unit Direction Vectors

Express the unit direction vectors of the above coordinate system in terms of the x-y coordinate system.

$\mathbf{e}_{\_}$ = _____

$\mathbf{e}_{\_}$ = _____

Angular velocity and Acceleration

Equate the accelerations to determine the angular velocity and angular acceleration of the disk.

ω = _____

α = _____