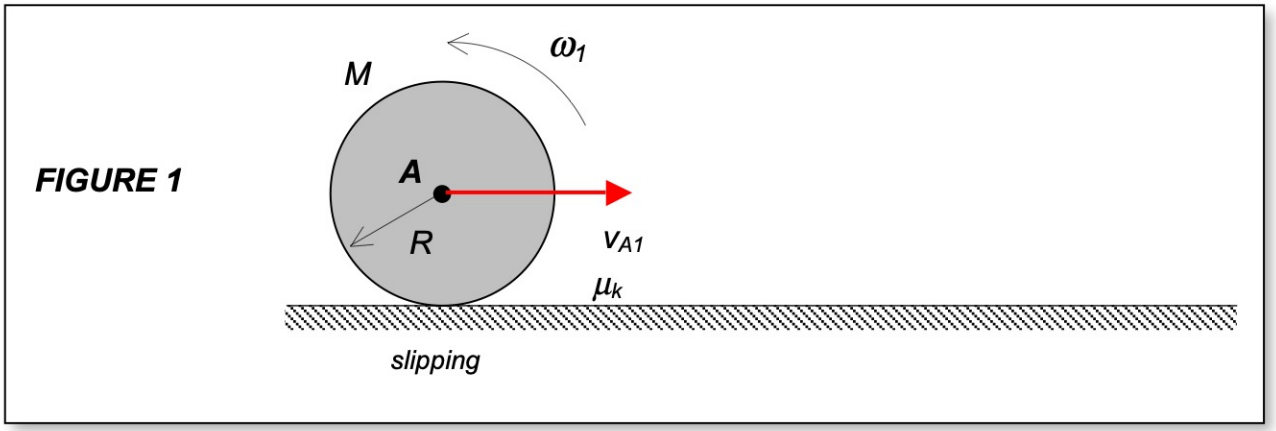
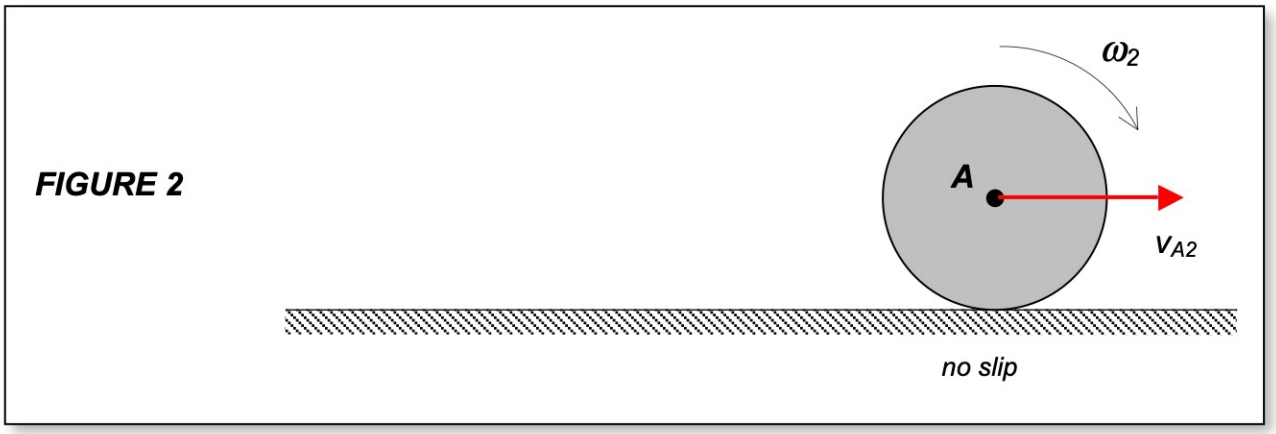
Homework H.5.K

Given: A homogeneous disk (with mass M and outer radius of R) is placed on a rough surface. When placed on this surface, the center of the disk A is moving to the right with a speed of v_{A1} and has a counterclockwise rotation rate of ω_1, as shown in Figure 1 below. In Figure 2 below is shown the instant at which the disk ceases to slip as it continues to move on the horizontal surface.

Find: For this problem:
(a) Determine the speed of A, v_{A2}, at the instant in Figure 2 when the disk ceases to slip on the horizontal surface; and
(b) Determine the elapsed time during the motion as the disk moves from the position in Figure 1 to the position in Figure 2.





Use the following parameters in your analysis: $M = 50$ kg, $R = 0.5$ m, $\mu_k = 0.3$, $v_{A1} = 5$ m/s and $\omega_1 = 8$ rad/s.