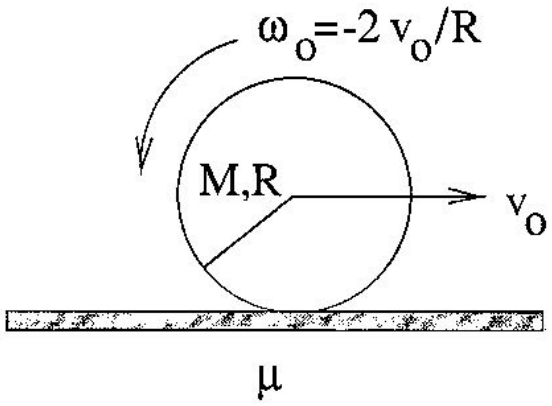
QP16



At $t = 0$, a solid sphere of mass M and radius R is spinning backwards while moving forwards on a table top of frictional coefficient μ. The initial velocity of the sphere is v_0 and the initial angular velocity is $\omega_0 = -2v_0/R$ as shown below.

a) (2 points) At what time t_0 does the sphere first roll without slipping?

b) (2 points) For times $t >> t_0$ draw and label a similar picture of the sphere, as above. Indicate the magnitude and direction of both the velocity and angular velocity.

c) (1 point) What is the magnitude and direction of the frictional torque τ_f at $t = 0$? What is it for $t >> t_0$?