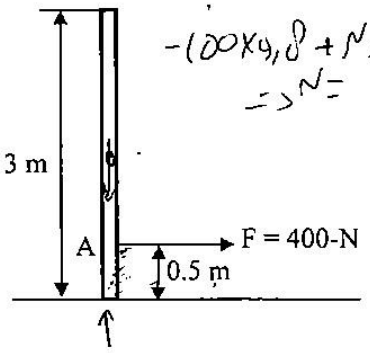
NOTRE DAME UNIVERSITY

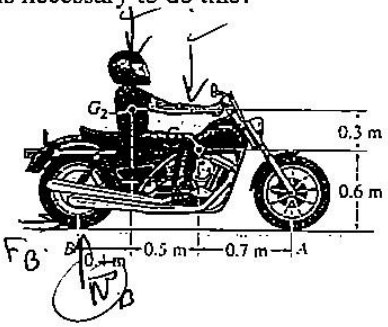
FACULTY OF ENGINEERING - MECHANICAL DEPARTMENT

Test 3
Instructor: _____ Time: 1 hr.

1. (30 points)
A uniform slender rod shown in this figure has a mass of 100 kg and a moment of inertia about its center of mass equal to 75 kg.m^2. The coefficients of static and kinetic friction between the end of the rod and the surface are 0.3 and 0.25 respectively. The rod is originally at rest. Suddenly a force of 400-N is applied as shown. At this instant,
   a. Determine whether the rod slips or not, then
   b. Determine the rod's angular acceleration.

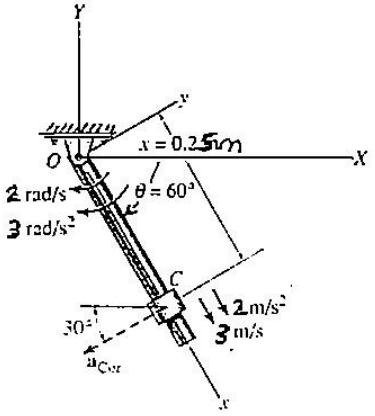


2. (25 points) The motorcycle shown has a mass of 130 kg and a center of mass at G_1, while the rider has a mass of 80 kg and a center of mass at G_2. Neglect the mass of the wheels.
   a. Determine the minimum coefficient of static friction between the wheels and the pavement in order for the rider to do a "wheeling" (i.e. lifting the front wheel off the ground).
   b. What acceleration is necessary to do this?



3. (40 points). The rod, at the instant θ = 60°, has an angular velocity of 2 rad/s and an angular acceleration of 3 rad/s^2. At this same instatnt, the collar C is traveling outward along the rod such that when x = 0.25 m the velocity is 3 m/s and the acceleration is 2 m/s^2, both measured relative to the rod. At this instant, determine
   a. The Coriolis acceleration
   b. The velocity and acceleration of the collar.

Ex-16-19 change values i



End of test 3.