



**MECH 211 Sections 2 and 3**

**Fall 2001**

**Test 3**

(due Dec 19, 2001 in ME 101)

Please show all work. Clearly indicate final answers.

This test is taken under the Rice Honor Code system. You may consult only the textbook (Pytel and Kiusalaas), and notes you have personally taken. You may use a calculator, including programmable calculators. The test must be taken during a contiguous 3 hour period, with an optional 30 minute break.

At the conclusion of the test, place it in an envelope, seal it, and write your name across the seal.

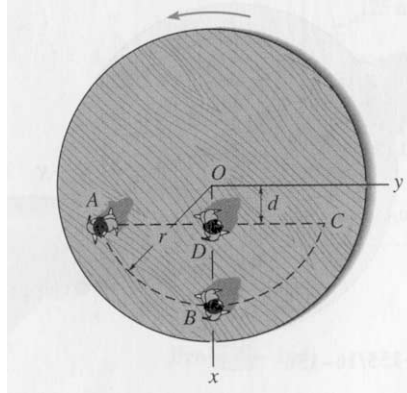
Time started: \_\_\_\_\_

Time finished: \_\_\_\_\_

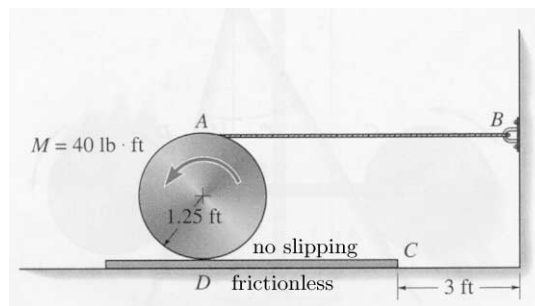
Pledge: \_\_\_\_\_



1. A girl stands at  $A$  on a platform which is rotating with an angular acceleration  $\alpha = 0.2 \text{ rad/s}^2$  and at the instant shown has an angular velocity  $\omega = 0.5 \text{ rad/s}$ . If she walks at a constant speed  $v = 0.75 \text{ m/s}$  measured relative to the platform, determine her acceleration (a) when she reaches point  $D$  in going along the path  $ADC$ ,  $d = 1 \text{ m}$ ; and (b) when she reaches point  $B$  if she follows the path  $ABC$ ,  $r = 3 \text{ m}$ . (14 points total).



2. The 15-lb disk rests on the 5-lb plate. A cord is wrapped around the periphery of the disk and attached to the wall at  $B$ . If a torque  $M = 40 \text{ lb} \cdot \text{ft}$  is applied to the disk, determine the angular acceleration of the disk and the time needed for the end  $C$  of the plate to travel 3 ft and strike the wall. The disk does not slip on the plate and the surface at  $D$  is smooth. Neglect the mass of the cord. (18 points total).



3. The collar  $B$  has a mass of 3 kg and may slide freely on rod  $OA$ , which in turn may rotate freely in the horizontal plane. The assembly is rotating with an angular velocity  $\omega = 1.8 \text{ rad/s}$  when a spring located between  $A$  and  $B$  is released, projecting the collar along the rod with an initial relative speed  $v_r = 1.5 \text{ m/s}$ . Knowing that the moment of inertia about  $O$  of the rod and spring is  $0.35 \text{ kg} \cdot \text{m}^2$ , determine (a) the minimum distance between the collar and point  $O$  in the ensuing motion, (b) the corresponding angular velocity of the assembly. (18 points total).

