

## Physics 160 Written Homework - Chapter 9

### 1 Rotation of Rigid Bodies

Two blocks hang from either end of a massless rope that runs over a pulley, treated as a thin solid disk, (An Atwood's Machine), and are held in place. One block has a mass of  $12kg$ , the pulley has a mass of  $2kg$  and radius  $5cm$ , and the other block's mass is unknown. The blocks are released from rest, and after an unspecified period of time, the block of known mass has descended  $2.5m$  and has a velocity of  $3m/s$  toward the ground. The rope does not slip over the pulley, and the pulley spins on a frictionless axle. Find the unknown mass of the block.

### 2 Rotation and Translation

Block A, mass  $5kg$ , rests on a surface with  $\mu_k = .6$ . A massless rope is attached to its right side, and runs over a pulley, treated as a thin ring, mass  $1kg$  and radius  $5cm$ , to Block B, mass  $7kg$ , which hangs from the rope and is held at rest. The rope does not slip over the pulley, and the pulley spins on a frictionless axle. Block B is released from rest, and after an unspecified period of time, it has descended  $2m$ . Find the velocity of Block B at this point.