----- Problem 1 -----
A 32 kg wheel is modeled reasonably well as a thin hoop of radius 1.3 m (nearly all the mass is concentrated at this radius). This hoop rotates around a stationary axle at 350 rev/min CCW. With a constant CW angular acceleration $\alpha$ it is brought to rest in 14 s.

- (1) What was the angular acceleration?
- (2) Through what angle did the wheel rotate while slowing down?
- (3) What is the rotational inertia $I$ of the wheel?
- (4) What was the net torque on the wheel while slowing down?
- (5) Calculate the net work done on the wheel to bring it to rest.
- (6) What was the average power associated with bringing the wheel to rest?

----- Problem 2 -----
A solid-disc pulley of mass 2.5 kg and radius 14 cm is mounted to a table’s edge. A string is fastened and wrapped around repeatedly. With the pulley held, the string’s other end is tied to a 0.7 kg block that hangs 1.2 m above the ground. When the pulley is released, the string unwinds without slipping. What is the block’s speed just before hitting the ground?

----- Problem 3 -----
A rod of mass 0.9 kg and length 1.2 m hangs from its end from a frictionless pivot. From this position, it is rotated CCW through $60^\circ$ and then released from rest. What is the speed of the TIP of the rod as it passes through vertical?

----- Problem 4 -----
Return to the hammer problem of Worksheet 19. Suppose that in this figure, there is a pivot at the origin to which the start of the handle is attached. What is the torque on the hammer due to gravity?

Answers
1. (1) $\alpha = -2.6180 \text{ rad/s}^{-2}$ (CW)
   (2) $\theta = +256.563 \text{ rad}$ (CCW)
   (3) $I = 54.08 \text{ kgm}^{-2}$
   (4) $\tau_{\text{net}} = -141.58 \text{ Nm}$ (CW)
   (5) $W_{\text{net}} = -36,324.5 \text{ J}$ (energy pulled out of system)
   (6) $P_{\text{avg}} = -2595 \text{ W}$
2. $v = 2.9057 \text{ m/s}$
3. $v_{\text{tip}} = 4.2 \text{ m/s}$
4. $\tau_{\text{gravity}} = -23.8 \text{ Nm}$ (CW)