

Name: [5 pts]

1) **moment of inertia**

Consider a shape of the letter H, as shown in the fig. 1, consists of three uniform rods, with length l and mass m , welded together.

- a) Find I_x . [2 pts]
- b) Find I_y . [2 pts]
- c) Find I_z . [2 pts]

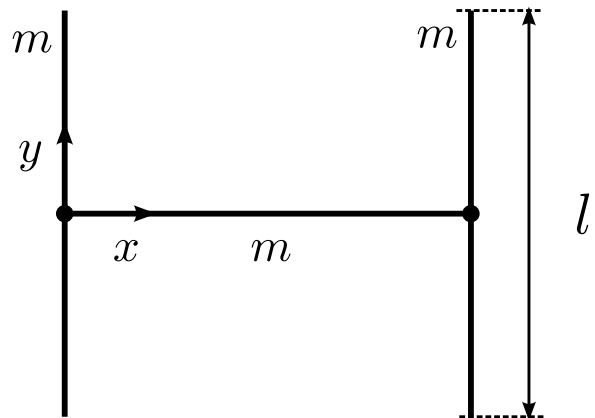


Figure 1: What is the moment of inertia?

2) A yo-yo is falling down as shown in the fig. 2. This yo-yo has a radius r , mass M , and the moment of inertia about the axis perpendicular to circles, passing through the center of it, is I .

- a) Find a relation between the velocity of the center of the yo-yo and the angular velocity of the yo-yo. [1 pt]
- b) Write down the kinetic energy in terms of r, M, I , and v , the velocity of the center. [2 pts]
- c) Using energy conservation, find the velocity of the yo-yo after it release it from rest and it comes down a height h . [2 pts]

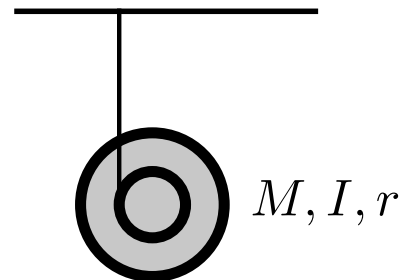


Figure 2: A yo-yo falling down.