**Hammer and Pulley Problem**
Below is a hammer that is being raised. The hammer is attached to an output pulley that it connected via a timing belt to an input pulley. The input pulley is attached to a motor that generates a torque of τ_m. The challenge is to find the size of the input pulley that can raise the hammer. The weight of the gears is negligible.

Tip: A belt can only transfer tension, and the tension force is in-line with the belt
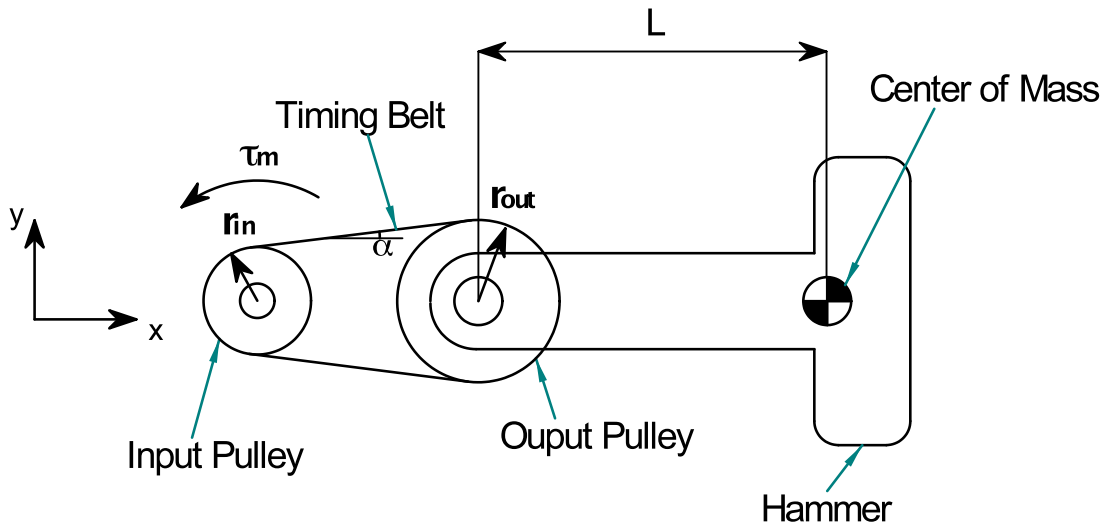
a) Only the top or bottom can be in tension, since the other is slack. Is it the top or bottom of the belt that is in tension?

b) Draw the Free Body Diagram of the Input Pulley and the Output Pulley and Hammer Assembly. "Cut" the belt in half, with a half shown on each FBD.

FBD of Input Pulley Gear	FBD of Output Pulley and Hammer Assembly

c) Show the equation the quasi-static equations in terms of the variables r_{in}, r_{out}, τ_m, L, and m (the mass of the hammer). Circle each equation.

Equations for Input Pulley	Equations for Output Pulley

d) Solve the quasi-static equation to show the maximum size of the input Pulley r_{in} in terms of r_{out}, τ_m, L, and m. Show your work.