

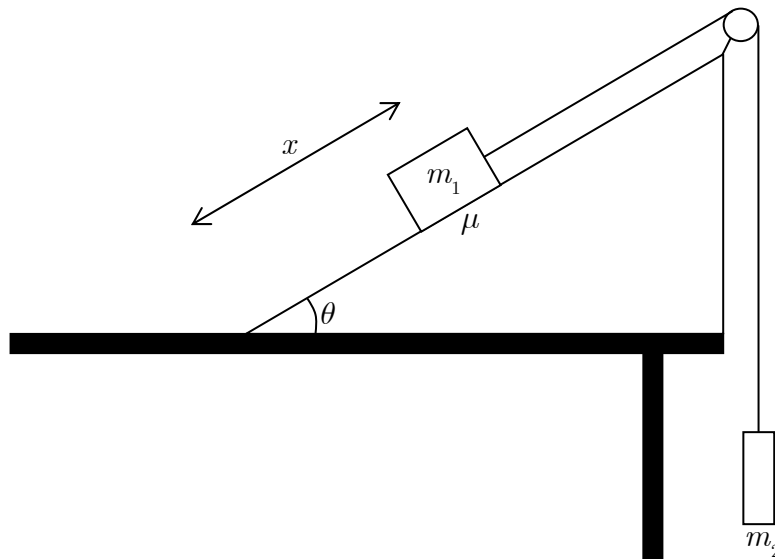
MASSACHUSETTS INSTITUTE OF TECHNOLOGY

Department of Physics

Physics 8.01T – Section L05 – Quiz 2

Name: \_\_\_\_\_ Table & Group Number: \_\_\_\_\_

A block of mass  $m_1$  rests at a distance  $x$  up a wedge (angle  $\theta$ ) which is itself attached to a table (the wedge does not move in this problem). An inextensible string is attached to  $m_1$ , passes over a frictionless pulley at the top of the wedge, and is then attached to another mass  $m_2$ , with  $m_2 < m_1$ . The coefficient of friction between  $m_1$  and the plane is  $\mu$ . The string and wedge are long enough to ensure neither mass hits the pulley or the table in this problem.



**Part (A)** – roughly 70 points

The system is released from rest as shown above, at  $t = 0$ . How long does mass  $m_1$  take to hit the table? (*Hint*: find the acceleration of the block when it is released).

**Part (B)** – roughly 30 points

A force of magnitude  $|\mathbf{F}| = bt$  now acts on mass  $m_1$ , pushing it up the plane. The system is released as shown above at  $t = 0$ . The mass starts moving down the plane, but then starts moving back up. Calculate the time  $t$  at which the mass stops moving down the plane. You may assume that this happens *before* the mass hits the table.

Remember – to get full points, you must draw any diagrams you used and outline your strategy (either before, during or after your solution to the problem) and you must make it clear what you are doing at each point in the problem. Don't just put a jumble of equations down on the paper.