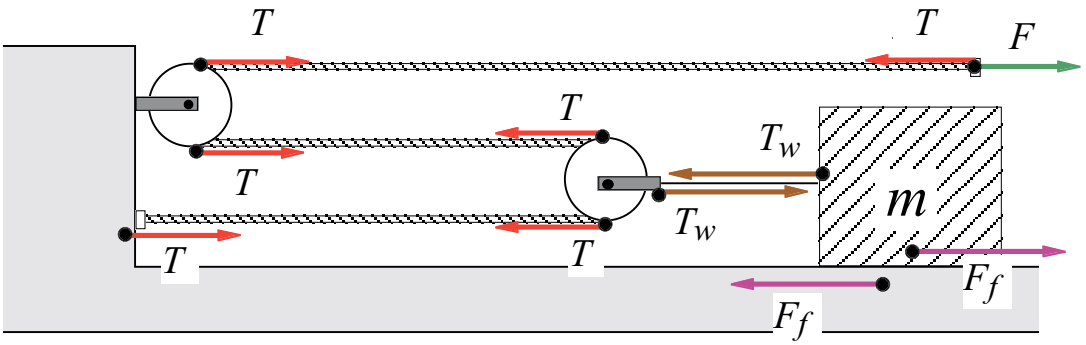
ISP209 Fall 2003 **Homework 7a** Name: _____

Due: Tues., Oct. 21, 10:20 am, in Rm 1410 BPS. ID:_____

(Note: For chapter 7, this is HW 7a. HW 7b is due next week.)

1. A horizontal force, **F** = +*F* (not zero), is observed acting on a box resting on a table, but the box does not begin to move. What is the magnitude and direction of the other force that must act on the object? magnitude _*F*_, and direction negative. What is the likely origin of the "invisible" force? static friction.
2. The motion of a mass through air is observed to have a constant speed and direction, however, a force **F** = +*F* (not zero), is known to act on the mass. What is the magnitude and direction of the other force that must act on the object? magnitude _*F*_, and direction negative. What is the likely origin of the "invisible" force? ? sliding (or air) friction.
3. A mass sliding on the ground has no obvious force acting on it, and yet it looses speed and then stops. What is the likely origin of the force that changes the speed of the mass? sliding (or air) friction



A massless rope runs through a pair of massless pulleys attached to the mass, *m*, and to a wall, as shown in the figure above. The force **F** = +*F* is being applied to the end of the rope but due to frictional forces acting on the mass it does not move. Draw and label the tension forces acting on the mass and on the pulleys.

$T = F$ (action – reaction pair at rope end)

$T_w = 2T = 2F$ (balance forces on pulley)

$F_f = T_w = 2F$ (balance forces on the mass)

$\mathbf{F}_f = +2F$ (same direcion as **F**)

$F_{wall} = 3T = 3F$ (same direction as **F**)

$\mathbf{F}_{wall} = +3F$

4. What is the magnitude of the tension acting at the ends of the rope?
   a) *F* b) 2*F* c) *F*/2 d) 3*F* e) 3*F*/2
5. What is the frictional force vector, $\mathbf{F}_f$, the ground applies to the mass?
   a) $\mathbf{F}_f = 0$ b) $\mathbf{F}_f = +F$ c) $\mathbf{F}_f = -F$ d) $\mathbf{F}_f = -2F$ e) $\mathbf{F}_f = +2F$
6. What is the net force vector, $\mathbf{F}_R$, that the rope applies to the wall (include the forces acting on the pulley attached to the wall)?
   a) $\mathbf{F}_R = +F$ b) $\mathbf{F}_R = -F$ c) $\mathbf{F}_R = -2F$ d) $\mathbf{F}_R = +2F$ e) $\mathbf{F}_R = +3F$