Your Name_____**Section**_____

HOMEWORK #4 - 8.01 MIT - Prof. Kowalski

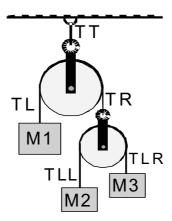## Due **4:00PM Thursday** Oct. 2, 2003

Topics: Newton's third law, forces, and motion with pulleys
The following problems are from Young and Freedman 11th edition. Additional parts are indicated after some of the problems.

1. **5.13**
2. **5.14**
3. **5.15** note that this is aspecial case of the Mastering Physics problem with a pulley and two masses, one of them on an inclined plane
4. **5.64**
   d) Estimate the height of the jump of the flea to relative accuracy 3%
5. **5.119**
6. **5.126** (which is easier than it looks)

7. **Three Masses and Two Pulleys**

This configuration of masses and perfect pulleys might be called a double Atwood machine. Your objective is to find the upwards acceleration of mass M1.

You can do this by actually solving the problem, but you don't have to. Use special cases, dimensional analysis, etc. to deduce which answer has to be correct. To earn partial credit, you might say in which special case each of the wrong answers fails, even if you can't identify the correct one with certainty.

a) Give at least three special cases in which the answer is obvious or can be worked

out easily

b) For all but one of these possible answers (We believe that one of them is correct.),

state at least one of your special cases that it fails to reproduce.

1. g* (2*m2*m3 – m1*m2)/(2*m2*m3+ m1*m2)

2. –g * (2*m2*m3 – m1*m2)/(2*m2*m3+ m1*m2)

3. g* (4*m2*m3 – m1*m2 – m1*m3)/(4*m2*m3+ m1*m2 + m1*m3)

4. - g* (4*m2*m3 – m1*m2 – m1*m3)/(4*m2*m3+ m1*m2 + m1*m3)

5. g* (m1 – m2 – m3)/(m1+m2+m3)

6. - g* (m1 – m2 – m3)/(m1+m2+m3)