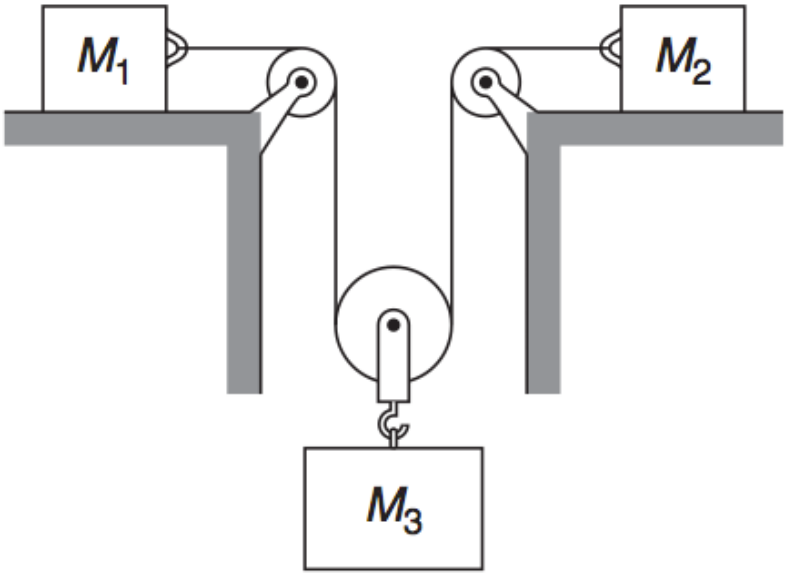
Homework 4: Newton's Laws

Due: Tuesday October 9, 16:00

Policy: Collaboration is allowed, but every student is required to hand in his/her own version of the solutions. Please include your name and student number on the solutions.

Problem 1. A space station circles around the earth. The astronauts (and everything else in the space station) are weightless. Is a coordinate system fixed to the space station an inertial system? Motivate your answer.

Problem 2. (K & K 2.10) The system of masses M_1, M_2 and M_3 in the sketch uses massless pulleys and an inextensible rope of length L. The horizontal table is frictionless. Gravity is directed downward.



1. Draw force diagrams and show all relevant coordinates.
2. How are the accelerations related?
3. Derive the expression for the tension in the rope:

$$T = \frac{g}{\frac{1}{2M_1} + \frac{1}{2M_2} + \frac{2}{M_3}}.$$