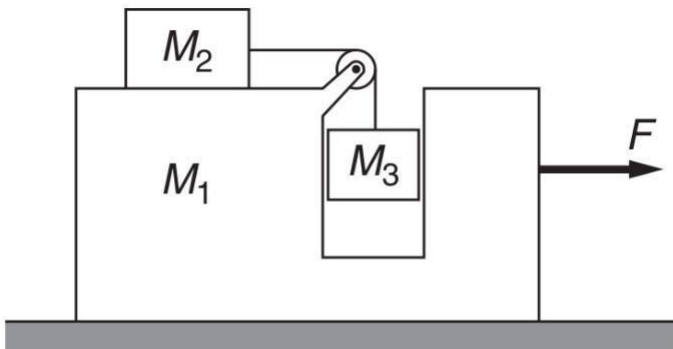


## Physics 2300: Problem Set #4

These problems are due on Wednesday (September 19). Remember to begin every problem with a concise problem statement, indicating what are the inputs and what is the goal. And while your solutions don't have to be essays, please include a few words of explanation as you go.

1. BTM probs 2.2.1 and 2.2.2
2. BTM probs 2.2.8 and 2.2.9
3. Morin 2.32 (Ladder on a corner)
4. Morin 3.29 (Atwood's 3)
5. Morin 3.47 (Throwing at a wall)
6. Morin 3.51 (Perpendicular to plane)
7. The infamous "pedagogical machine". Consider a system of three blocks (with masses  $m_1$ ,  $m_2$  and  $m_3$ ) with frictionless surfaces. Block 2 is free to slide horizontally on top of block 1, which in turn slides on a frictionless table. Block 3 is free to slide up and down relative to block 1, i.e. it is an elevator car constrained to slide in a vertical shaft cut in to block 1. There is a massless string and pulley connecting blocks 2 and 3.



- (a) If an external force  $F$  is applied to block 1, what value of  $F$  will allow  $m_3$  to remain at the same height?
  - (b) With no external force ( $F = 0$ ), what is the acceleration of block 1?
8. (BONUS) Morin 3.50 (Cart, ball and plane). Solve "by hand" as usual, and then use Mathematica to Animate the motion, producing an animated gif. A starting notebook will be provided.