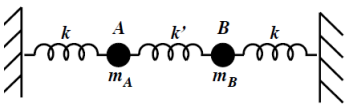
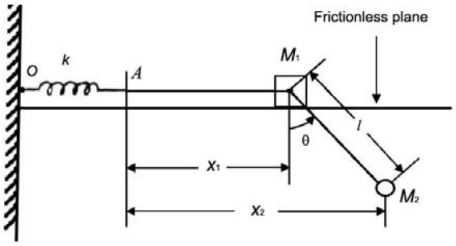
BirZeit University
Faculty of Science-Department of Physics
Physics of waves and vibrations, Phys236
Spring 2018
HW3, Due April 17th 2018

1. Two objects, A and B , with masses m A and m B , respectively, are connected by springs as shown in the figure. The spring constant of the spring on the left and on the right are both k ; the spring constant of the spring in the middle is k' .



   1. If $m_A = \infty$, what are the normal mode frequencies of the system?
   2. If k = 0, what are the normal mode frequencies of the system?
   3. If $k' = 0$, what are the normal mode frequencies of the system?
   4. For the general situation, write down the coupled equations of motion.
   5. Find the normal mode frequencies for the general situation.

2. The sketch shows a mass M_1 on a frictionless plane connected to support O by a spring of stiffness k. Mass M_2 is supported by a string of length l from M_1 . OA is the length of the relaxed spring. x_1 and x_2 are the positions of M_1 and M_2, respectively, relative to point A.



   1. Write down the differential equations of motion for each mass.
   2. For $M_1 = M_2 = M$, calculate the normal mode frequencies (use the small angle approximation for the pendulum).