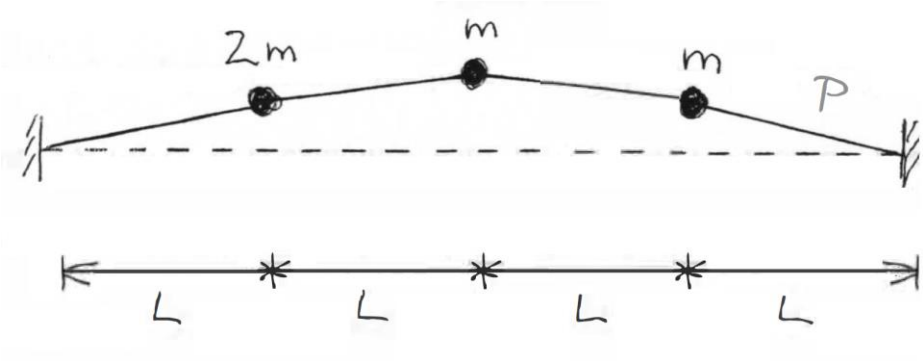
MECH 463 -- Homework 10

1. Three concentrated masses 2m, m, and m are fixed at equal intervals L along the length of a stretched string, of total length 4L, and tension P. The masses can vibrate perpendicular to the length of the string.



   (a) Draw free-body diagrams and formulate the equations of motion in matrix format. For convenience, you may write k = P/L.

   (b) Use Lagrange's equations to formulate the equations of motion, and confirm that the result 1s the same as in part (a).

2. A ball of mass m, radius r and moment of inertia $I = {}^{2}/_{5}\, m\, r^{2}$ rolls without slipping in a bowl of radius R.

   (a) Draw a free-body diagram and formulate the equations of motion for small vibrations.

   (b) Use Lagrange's Equation to formulate the equations of motion for small vibrations. Confirm that the result is the same as in part (a).