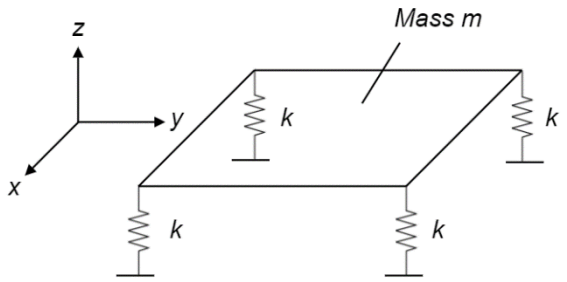
Lab 1 Assessment Questions

Please type your submission and submit your answers as a PDF with the Excel data file separately.



1. In this lab, the apparatus is a simple platform suspended by springs as shown above. When modeling a stiffness/elastic element as a spring, it is typically assumed that the spring provides a stiffness in only the axial direction (ie. in the z – direction).
    a) **(1 pt)** How much would the natural frequency of vibrations in the vertical direction increase if the stiffness of each spring is doubled?
    b) **(3 pts)** The springs are manufactured such that they are also able to resist lateral forces (ie. in the x and y directions). If the springs have both an axial and lateral stiffness, determine how many degrees of freedom the system has and state each degree of freedom.

Plot the vertical acceleration versus time. Using your plot:

2. **(4 pts)** Calculate the damping ratio using the logarithmic decrement. Use a set of peaks away from the beginning of the measured response due to the initial lateral motion of the platform when it is released.
3.
4. **(3 pts)** If each spring has a stiffness of 2.8 kN/m, calculate the mass of the platform.

5. **(2 pts)** Determine the effective damping of the system.

6. **(2 pts)** If the metal springs were replaced with rubber springs of the same stiffness, would you expect the oscillation period to increase or decrease? Why?