

## Lecture 28 Homework

A tank of mass  $m_3$  is mounted on the floor of a building as shown in the accompanying figure.

- a) Using Lagrange's equations determine the equations of motion for the system.

If  $k_1 = k_2 = 200e6$  lb/in,  $k_3 = k_1/4$ ,  $m_1 = m_2 = 2e5$  lb-s<sup>2</sup>/in and  $m_3 = m_1/10$  determine:

- b) The natural frequencies of the system  
 c) The mass normalized modes of the system  
 d) The steady-state response if the system if it is forced with  $F = 500 \sin 40t$  lb. Assume the initial conditions are all zero.  
 e) Assuming you were given initial conditions discuss how would determine the total response of the system.

