Homework Assignment #2 **ELEC 5760/6760** **Due: Mon. 2/4/13**

1) A MEMS Si cantilevered beam is used as a spring. It is 500µm long, 20µ thick and 10µm wide. At its free end, there is an attached Si rectangular proof mass, 20µm thick, 1000µm long and 1000µm wide. For Si having a Young's Modulus of 170GPA and a density of 2.35g/cm^3:
   a. What is the spring constant in N/m?
   b. What is the volume of the proof mass in m^3?
   c. What is the mass of the proof mass in g?
   d. What is the systems natural frequency in Hz?
   e. If the mass experiences a 500G acceleration so that the beam bends in the direction of its thickness, what is the displacement of the proof mass in µm (1G = 9.8m/s^2)?

2) For the MEMS device shown below, what is an approximate expression for the system spring constant for the mode where the proof mass moves perpendicular to the plane of the paper?