# MECH 463 -- Tutorial 6

1. The diagram shows two masses connected by three springs. Assume that the masses only translate and do not rotate. Draw the free body diagram of the system, including the two applied forces $f_1(t)$ and $f_2(t)$. Formulate the equations of motion and find the natural frequencies and mode shapes. Comment on your results. Reformulate the equations of motion into uncoupled form, including the terms due to the applied forces. Be careful to explain all significant steps in your formulation.
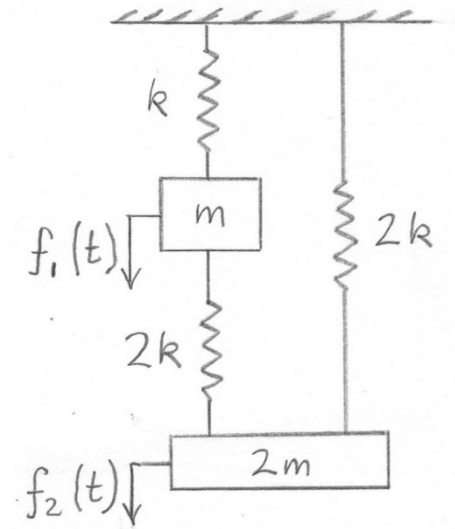
2. The diagram shows an idealized model of a pin- ended strut under axial compression. The strut is divided into two parts connected by a torsional spring of stiffness $S = EI/L$. The mass density of the strut is ρ and the cross-section area is A Formulate the equation of motion of this 1-DOF system, and determine the natural frequency as a function of the axial force P. Hence find the critical load for buckling.