Complete the following problem. The nonlinear dynamic equations for a single-link manipulator with flexible joints are given by (taken from Khalil problem 1.2):

$$I\ddot{q}_1 + MgLsin(q_1) + k(q_1 - q_2) = 0$$

$$J\ddot{q}_2 - k(q_1 - q_2) = u$$

a) Use $q_1, \dot{q}_1, q_2, \dot{q}_2$ as states and u as the input (others variables are all constant values) to put the system into nonlinear state space form.
b) Find the systems equilibrium point when $u = 0$.
c) Use the equilibrium point found in b) to derive the linear state-space format.