Homework H6.I

Given: Blocks A and B (having masses of m and $2m$, respectively) are connected by a cable-pulley system as shown below. Two springs, each of stiffness k, are attached between blocks A and B and ground, as shown below. A horizontal force F is applied to B. The mass of the pulley is negligible, and the cable remains taut during all motion. Let x describe the position of B, and let $x = 0$ correspond to the state at which the springs are unstretched.

Find: For this problem:
(a) Draw a free body diagram for each block; and
(b) Derive the differential equation of motion for the system in terms of the coordinate x.