Math 142-2, Group work 4

Problem 1

A wheel with radius r spins freely and without friction about its center. One end of a spring is attached to the wheel at a distance of s from the center of the wheel. The other end of the spring (restlength ℓ, spring constant k) is fixed to a point d below the wheel's center. A mass m is attached to the wheel opposing the spring's attachment point. Find the equations of motion for the wheel, parameterized by the polar angle θ of the spring's attachment point. Your answer should be an ODE of the general form $\ddot{\theta} = f(\theta, \dot{\theta}, t)$. Hint: formulating energy first is easier.