1 Simple Harmonic Oscillator

A particle of mass m moves along that x direction under the influence of a force $f(x) = -kx$ and there is no other force.

1.1 Lagrangian

Find the Lagrangian, $L(x, \dot{x}) \equiv T - U$, in terms of m, k, x, and $\dot{x}$, for this particle.

1.2 Equation of Motion

Apply Lagranges equations to this Lagrangian to get the equations of motion for this particle. Your answer should be like $\ddot{x} =?$.