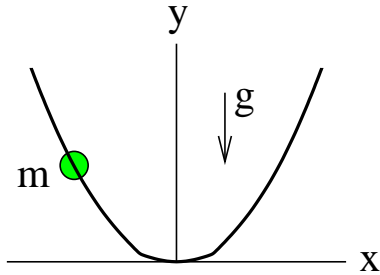## [mex131] Parabolic slide

A bead of mass m slides without friction along a wire of parabolic shape, $y = Ax^2$, in a uniform gravitational field g pointing in the negative y-direction.
(a) Construct the Lagrangian $L(x, \dot{x})$.
(b) Derive the Lagrange equation.
(c) Linearize the Lagrange equation and determine a harmonic small-amplitude solution.

Solution: