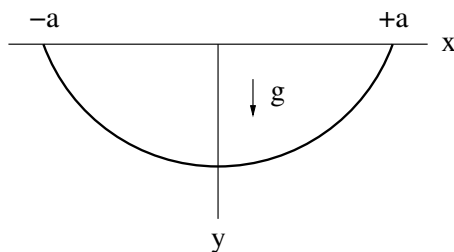


**[mex38] Catenary problem**

Consider a chain of length  $L$  and mass per unit length  $\rho_L$ . Its ends are suspended from two fixed points which are positioned at the same height and a distance  $2a$  apart. Use the calculus of variation with an auxiliary integral constraint to show that the shape of the chain is described by the function  $y(x) = A - B \cosh(x/B)$ , where  $A, B$  are constants.



**Solution:**