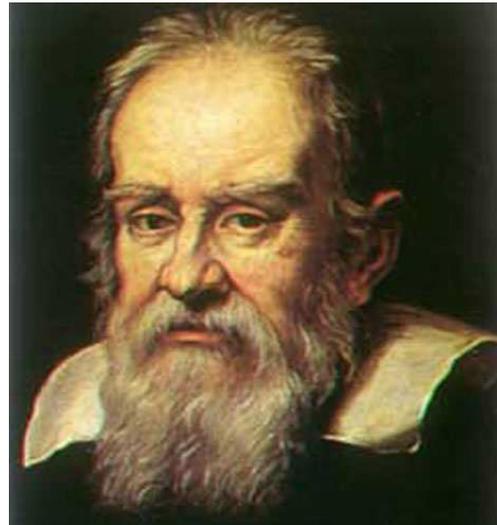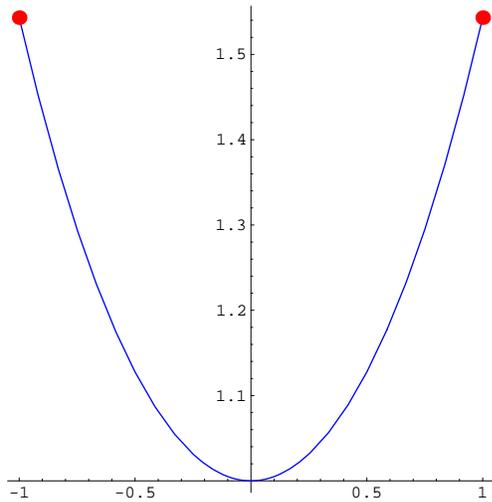Find the arc length of the catenary $\vec{r}(t) = \langle t, \cosh(t) \rangle$, where $\cosh(t) = (e^t + e^{-t})/2$ is the **hyperbolic cosine** and $t \in [-1, 1]$.

Hint: Use the identity $\cosh^2(t)^2 - \sinh^2(t) = 1$, where $\sinh(t) = (e^t - e^{-t})/2$ is the **hyperbolic sine**.

HISTORY: Galileo was the first to investigate the catenary. It is the curve, a freely hanging heavy rope describes, if the end points have the same height. Galileo mistook the curve for a parabola. It was Johannes Bernoulli in 1691, who obtained its true form after some competition involving Huygens, Leibniz and two Bernoullis. The name "catenarian" (=chain curve) was first used by Huygens in a letter to Leibnitz in 1690.