

**HW 8 (Due November 23)** Let  $a$  be a positive constant. Prove that as the parabola  $y = \frac{1}{4a}x^2$  rolls along the  $x$ -axis without slipping, the focus of the parabola traces out a catenary. *Hint:* Parameterize the parabola by letting  $x = 2a \sinh(t/a)$ .