equation is obtained, it is seen that the curve is a hypocycloid of three cusps. This is deduced in the following way:

The radius of curvature is found from (2) to be

$$R = \frac{2p(3 - p^2)}{(1 + p^2)^{3/2}}. \tag{3}$$

The length of arc is

$$S = \int_0^p \frac{2p(3 - p^2)}{(1 + p^2)^{5/2}} dp = -\frac{8}{3}\frac{1}{(1 + p^2)^{3/2}} + \frac{2}{(1 + p^2)^{1/2}} + \frac{2}{3},$$

from which

$$\frac{3}{2}\left(S - \frac{2}{3}\right) = \frac{3p^2 - 1}{(1 + p^2)^{3/2}}. \tag{4}$$

In order to eliminate p from equations (3) and (4), form the expressions $R^2/4$ and $\frac{9}{4}(S - \frac{2}{3})^2$. It is seen at once that

$$\frac{R^2}{4} + \frac{9}{4}\left(S - \frac{2}{3}\right)^2 = 1, \quad \text{or} \quad R^2 + 9\left(S - \frac{2}{3}\right)^2 = 4, \tag{5}$$

which is the intrinsic equation of a hypocycloid. The curvature of (2) is

$$k = \frac{(1 + p^2)^{3/2}}{2p(3 - p^2)}, \tag{6}$$

also

$$\frac{dx}{dp} = \frac{2p(3 - p^2)}{(1 + p^2)^3}, \quad \frac{dy}{dp} = \frac{2p^2(3 - p^2)}{(1 + p^2)^3}. \tag{7}$$

From (6) and (7) it is seen that when $p = 0$ or $\pm\sqrt{3}$, dx/dp and dy/dp become zero and $k = \infty$. Hence (5) is the equation of a hypocycloid of three cusps.

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HERMITE'S WORKS.

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