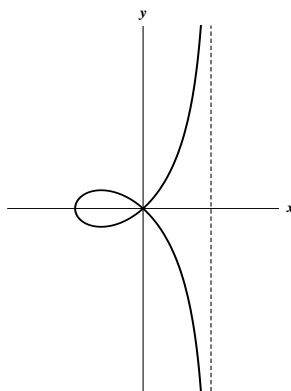


3. [10 points] The motion of a particle is given by the following parametric equations



$$x(t) = \frac{a(t^2 - 1)}{t^2 + 1} \qquad y(t) = \frac{t^3 - t}{t^2 + 1}.$$

for $-\infty < t < \infty$ and $a > 0$. Show all your work to receive full credit.

- a. [3 points] Find the values of t at which the particle passes through the origin.
- b. [5 points] Find the value of t at which the curve defined by the parametric equations has a vertical tangent line. Also, give the (x, y) coordinates of this point.
- c. [2 points] The curve has a vertical asymptote. Find the equation of this asymptote.