

1. The *Witch of Agnesi* curve is known by the parametric equation

$$x = at, \quad y = \frac{a}{1+t^2}, \quad t \in (-\infty, \infty), \quad a \text{ is a fixed constant.}$$

Find a point where the tangent line is horizontal.

2. The *cardioid* curve is given by

$$x = 2a \cos t - a \cos 2t, \quad y = 2a \sin t - a \sin 2t, \quad t \in [0, 2\pi], \quad a \text{ is a fixed constant.}$$

Find the parametric form of the tangent line at  $t = \pi/2$ .

3. Find the slope of the curve at  $t = 1$ ,

$$xt = \sqrt{5 - \sqrt{t}}, \quad y(t-1) = \ln y$$

if  $x$  and  $y$  are implicitly differentiable functions of  $t$ .