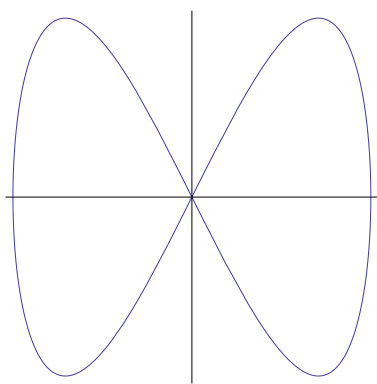# Weekly Assignment 9

Bowditch curve

The Bowditch curve is defined by the parametric equations

$$x = \sin(t/2), \quad y = \sin(t)$$

It is a *closed curve* meaning it begins to repeat itself as t gets larger and larger.

1. Starting with $t = 0$, determine the first t-value greater than 0 such that the curve begins to repeat itself.

2. Find an equation for the tangent line when $t = 0$.

3. From the above plot, it is clear there are four points on this curve where the curve has horizontal tangents. Find t-values for these four points and then give the (x, y) coordinates for these points.

4. There are two points on this curve where the curve has vertical tangents. Find t-values for these two points and then give the (x, y) coordinates for these points.

5. Calculate the length of this curve. (Use technology to compute any integrals.)

Identifying curves

For each of the sets of parametric equations, eliminate the parameter to get a Cartesian equation and identify the curve.

1. $x = \cos(t)$
   $y = \sec(t)$

2. $x = 2\,e^t + 3$
   $y = -e^{2t}$