Desmos graphs

8 | swallowtail catastrophe curves

Defined by

$$x = 2ct - 4t^3$$
$$y = -ct^2 + 3t^4$$

8.1 | features

8.1.1 | approaches a parabola-like shape above the y-axis

8.1.2 | approaches a parabola-like shape below the x-axis if $c > 0$

8.1.3 | has a cross-over in a triangle shape

1. gets bigger when c gets bigger

8.1.4 | it looks like a dorito that scales with the value of c

1. as c approaches zero from the positive direction, the swollowtail gets smaller

9 | Lissajous Figures

Defined by

$$x = a\sin(nt)$$
$$y = b\cos t$$

9.1 | features

9.1.1 | spring-like coil shape (almost like standing waves) with tighter "loops" at the ends

9.1.2 | a, b control the size of the coil (default $-1 \leq x, y \leq 1$ because of range of $\sin, \cos$

9.1.3 | number of y-intercepts is $n + 1$ except in the degenerate cases $n \leq 0$