Lissajous Curves

Drawing Mathematics with Desmos | Justin Skycak

Setup. Navigate to https://www.desmos.com/calculator. Be sure to sign in so that you can save your graph.

Demonstration - Lissajous Curves. Lissajous curves take the form

$$\begin{aligned} x &= \sin(t) \\ y &= \sin(at+b) \end{aligned}$$

for some values of a and b. Observe the graph as you type each of the following Lissajous plot inputs, with $0 \leq t \leq 100$.

$$(\sin(t), \sin(t+1))$$

$$(\sin(t), \sin(t+2))$$

$$(\sin(t), \sin(t+3))$$

$$(\sin(t), \sin(2t+1))$$

$$(\sin(t), \sin(3t+1))$$

$$(\sin(t), \sin(4t+1))$$

$$(\sin(t), \sin(5t+1))$$

$$(\sin(t), \sin(1.1t + 1))$$

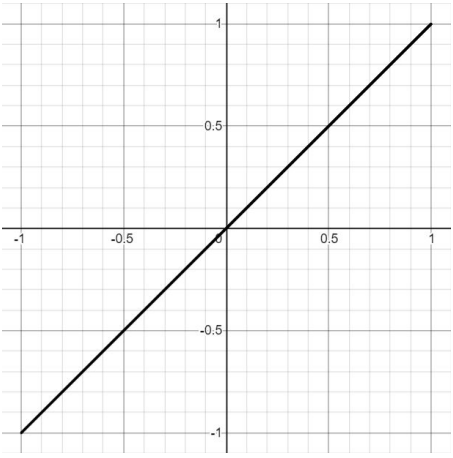
$$(\sin(t), \sin(1.2t + 1))$$

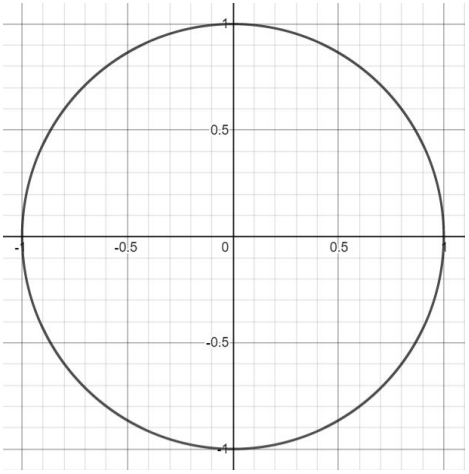
$$(\sin(t), \sin(1.3t + 1))$$

$$(\sin(t), \sin(1.4t + 1))$$

$$(\sin(t), \sin(1.5t + 1))$$

Exercise. Attempt to reproduce the graphs below by setting $a = 1$ and varying the b parameter in the Lissajous curve equations. You may have to play with the parameter a bit to get a sense of what it controls.

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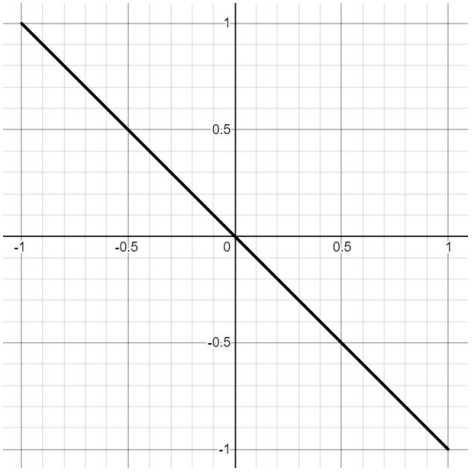
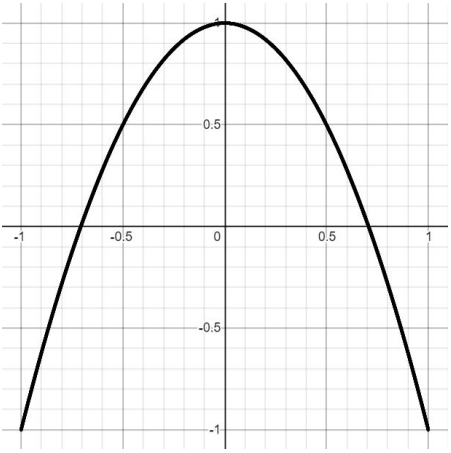
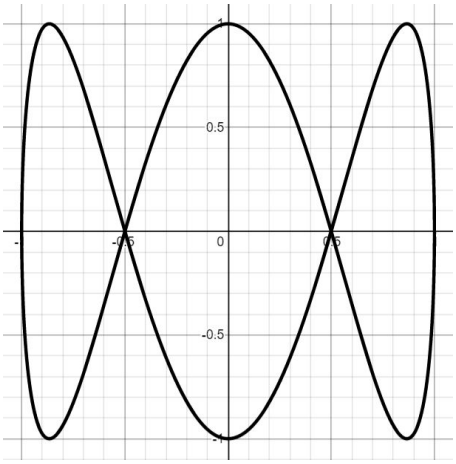
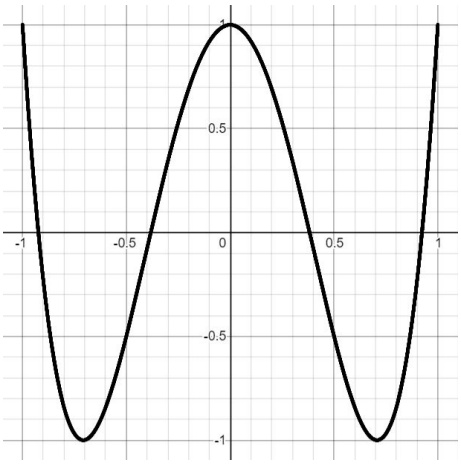
0.5
-0.5
0
0.5
-0.5
-1

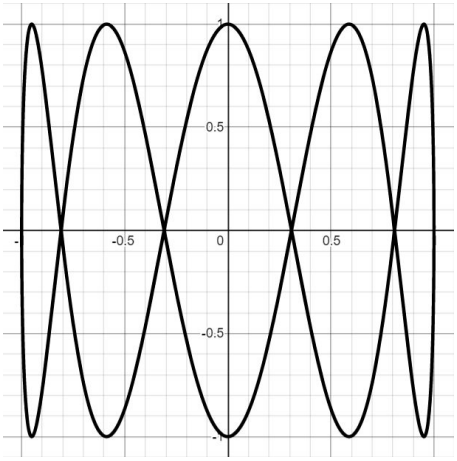

1
0.5
-1
-0.5
0
0.5
1
-0.5
-1

Exercise. Attempt to reproduce the graphs below by setting $b = \frac{\pi}{2}$ and varying the a parameter in the Lissajous curve equations. You may have to play with the parameter a bit to get a sense of what it controls.

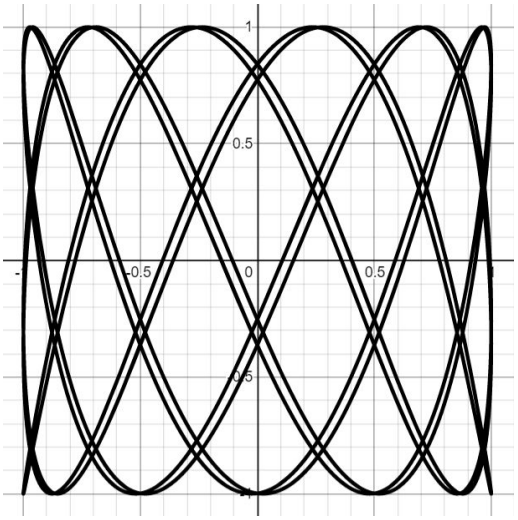








Challenge. Attempt to reproduce the Lissajous graphs below by setting $b = 1$ and varying a.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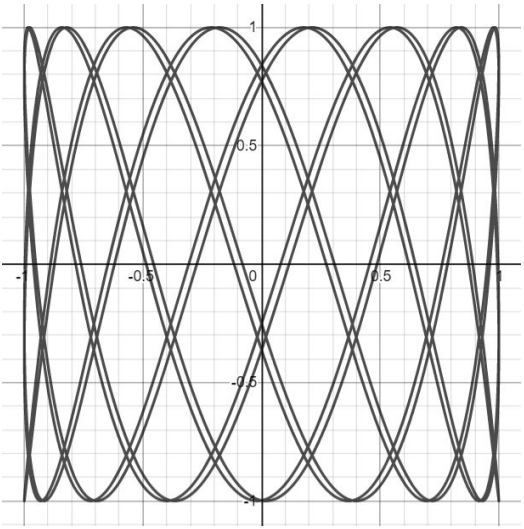
0
0.5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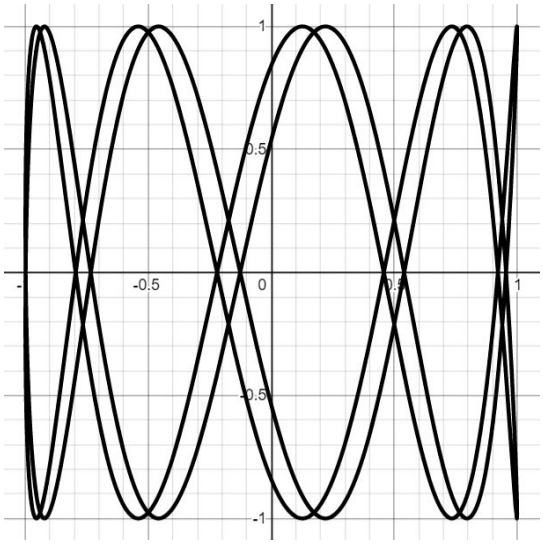
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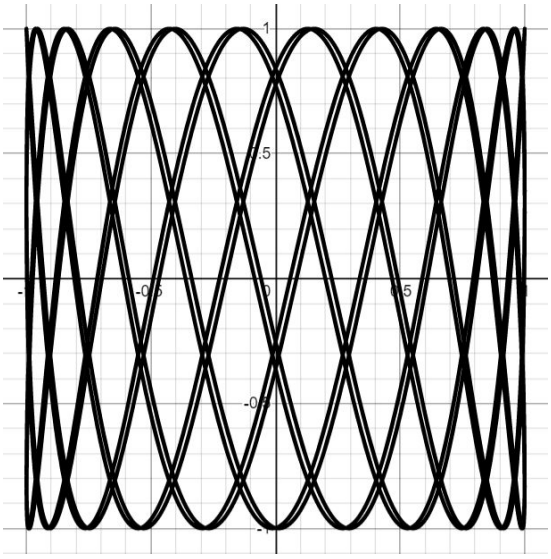
-0.5
0
-1


1
0
-1