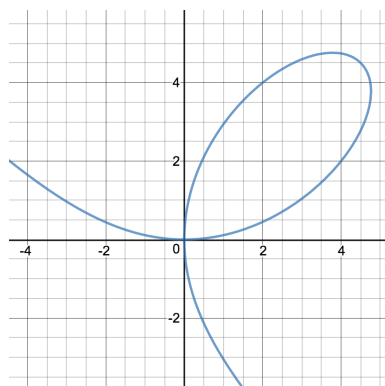
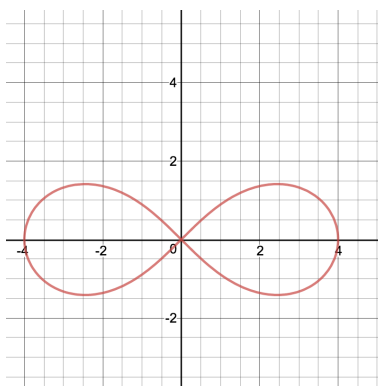


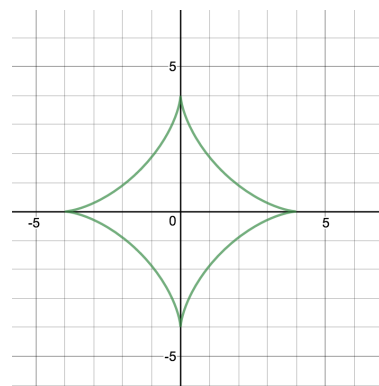
- i) For each of the curves presented below, how many functions do we need to describe them and why? Moreover, can we describe any of them with a single function?



(a) Folium of Descartes  
 $x^3 + y^3 = 9xy$



(b) Lemniscate of Bernoulli  
 $x^4 + 2x^2y^2 + y^4 = 16(x^2 - y^2)$



(c) **Astroid**  
 $x^{2/3} + y^{2/3} = 4^{2/3}$

- ii) Using the chain rule (that we studied last time), what is the derivative of the function  $(3 \sin x + 4x)^2$ ?

- iii) Let us suppose we now decide to set  $y = y(x) = 3 \sin x + 4x$ . Rewrite the above function and its derivative using only  $y$  and  $y'$ .

iv) Compute the derivative of  $\cos(x^3 + 2x + 5)$ .

v) Let us set  $y = y(x) = x^3 + 2x + 5$ . Rewrite the above function and its derivative using  $y$  and  $y'$  but not  $x$ .