ESP Math 179

Worksheet 12

Fall 2015

6 October 2015

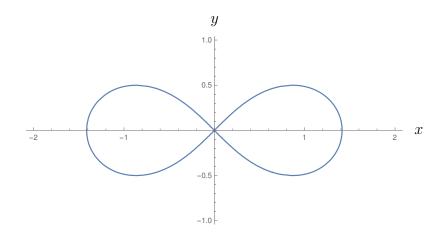
1. Warm up: For any function f, we sometimes abbreviate $f(f(x)) = (f \circ f)(x) = f^{\circ 2}(x)$. Find the derivatives of f(x), f(f(x)), f(f(f(x))) and $f^{\circ n}(x)$ for the following functions f.

(a) $f(x) = x^2$ (b) $f(x) = \sqrt{x}$ (c) $f(x) = e^x$

2. Complete the following table, filling in yes/no in the boxes if the given function has/doesn't have the given property on the whole real line.

	e^x	$\ln(x)$	1/x	$\sin(x)$	$\tan(x)$	0	1	x^2	x^3	$\arctan(x)$	x
continuous											
differentiable											
constant											
odd											
even											
invertible											
increasing											
has VA's											
has HA's											
periodic											
rational											
has maxima											
has minima											

3. Below is the graph of $(x^2 + y^2)^2 = 2x^2 - 2y^2$.



Just by looking at the graph, answer the following questions.

- (a) How many points on the graph are there for which y' = 0?
- (b) Choose any real number c.
 - i. How many points on the graph are there for which y' = c?
 - ii. How many points on the graph are there for which x' = c?

- 4. Consider the function y(x) given by $y = x^2y^3 + x^3y^2$, with y(1) = 1.
 - (a) What is the derivative of y(x) at x = 1?
 - (b) What is the derivative of $e^{y(x)}$ at x = 1?