

Chain Rule & Implicit Differentiation Worksheet

1. Use the given table to answer the following questions.

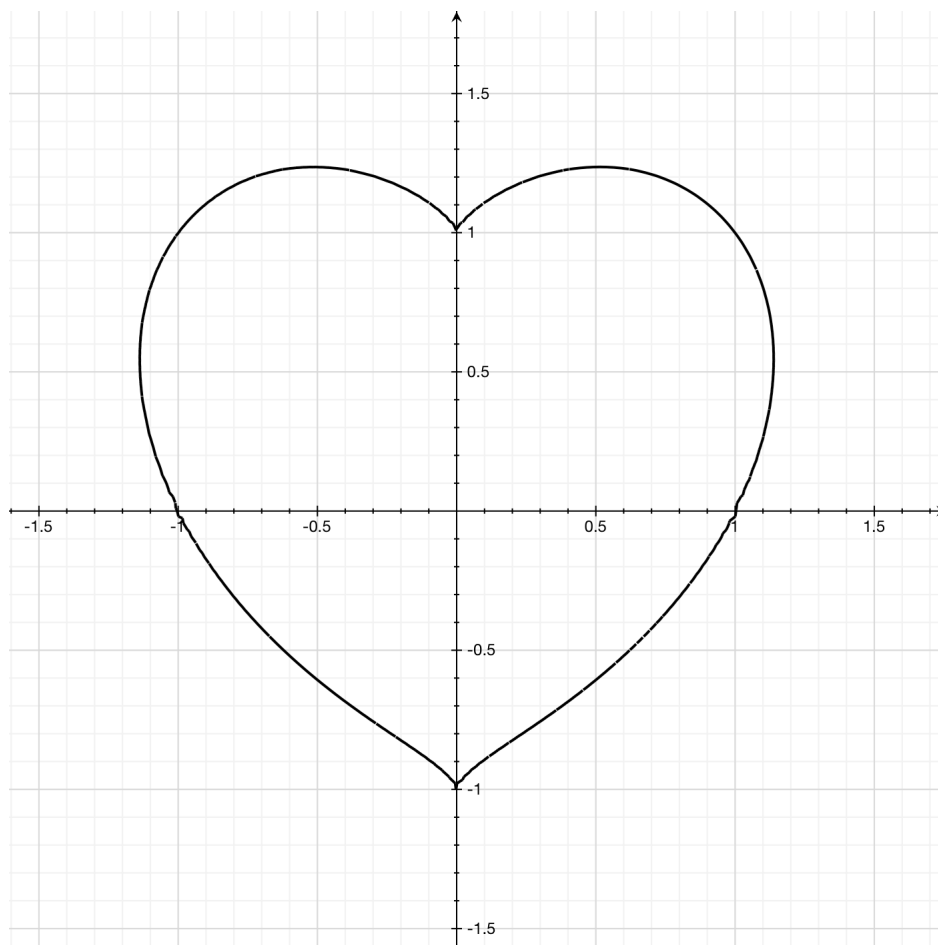
x	$f(x)$	$f'(x)$	$g(x)$	$g'(x)$
-1	2	3	2	-3
2	0	4	1	-5

- (a) Let $h(x) = f(g(x))$. Compute $h'(-1)$.
(b) Let $h(x) = [f(x)]^2$. Compute $h'(2)$.
(c) Let $h(x) = [g(f(x))]^3$. Compute $h'(-1)$.

For problems 2-7, differentiate.

2. $f(x) = (3x^4 - 7)^{10}$
3. $y = \cos(1 - x)$
4. $g(x) = \frac{4}{\sqrt{25x^2 + 2}}$
5. $y = \tan(\cos x)$
6. $y = \sec(\sqrt{x^3 + x})$
7. $f(x) = \left(\frac{1 + x^2}{1 + x^6}\right)^{11}$
8. Consider $f(x) = \cos(3x)$. What is $f^{(37)}(x)$?
9. Evaluate $\frac{d^2}{dx^2} \left(\frac{1}{1 - 2x}\right)$
10. Find $\frac{dy}{dx}$ in terms of x and y .
(a) $x^3 + y^3 = 3xy^2$
(b) $\cos(xy^2) = y$
11. Find $\frac{d^2y}{dx^2}$ in terms of x and y .
(a) $2x^2 - 3y^2 = 4$
(b) $y + \sin y = x$

12. The curve below is the graph of $(x^2 + y^2 - 1)^3 - x^2y^3 = 0$.



- (a) Sketch the tangent line to the graph at the point $(-1, 1)$.
- (b) Find an equation of line which is tangent to the graph at the point $(-1, 1)$.
Pro-tip: Plug in $(-1, 1)$ after applying $\frac{d}{dx}$ to both sides of the equation but before solving for $\frac{dy}{dx}$.