

AP Calculus – Worksheet – Chain Rule

Find the derivative of each of the following functions and parametric equations.

1. $f(x) = (3x^2 + 5x)^3$

6. $x(t) = 6t + 1$
 $y(t) = 4t^2 - 6t + 5$

2. $g(x) = \sqrt[3]{4x^2 + 5x}(3x + 5)$

7. $x(t) = \cos(2t)$
 $y(t) = \sin(4t)$

3. $s(d) = \frac{\sqrt{d - 4d^2}}{(d + 1)^2}$

8. $x(\theta) = \theta$
 $y(\theta) = 2 - 2\cos \theta$

4. $g(x) = \frac{6 - x - x^2}{x + 3}$

9. $f(x) = 2\sin(\tan(3x))$

5. $x(t) = t$
 $y(t) = 3t^2 + 6$

10. $g(x) = (\sqrt{x + 2})^{1/2}$

$$11. y = \cos^2(4x)$$

$$13. f(x) = \sqrt[4]{1+2x+x^3}$$

$$12. f(x) = \frac{\sin(2x)}{(4x+1)^2}$$

$$14. y = \frac{x^2 - x^{-2}}{x^2 + x^{-2}}$$

Convert Problem 5 and 6 from parametric equations to functions and then take the derivative.

15.

16.

17. If $F(x) = f(g(x))$, where $f(-2) = 8$, $f'(-2) = 4$, $f'(5) = 3$, $g(5) = -2$, and $g'(5) = 6$, find $F'(5)$.

18. The following table of values contains f , g , f' , and g' , use them to find:

x	$f(x)$	$g(x)$	$f'(x)$	$g'(x)$
1	3	2	4	6
2	1	8	5	7
3	7	2	7	9

a. If $h(x) = f(g(x))$, find $h'(1)$.

b. If $H(x) = g(f(x))$, find $H'(1)$.