

Name: _____

The Chain Rule

1) Find the derivative of each function.

1) $y = (3x + 100)^{60}$

2) $y = \frac{x}{\sqrt{1-x^2}}$

3) $x^2 \sin^3(1+3x)$

4) $f(x) = (2x-5)^{-1}(x^2-5x)^6$

5) $f(x) = \sqrt{1-x^3}$

6) $f(x) = 2\sin^4(3x+1)$

7) $f(x) = (4-3x)^9$

8) $y = \cos^4 x$

9) $y = \cos^5 2x$

10) $y = \cos(3x+4)$

11) $y = (1+\sin^2 x)^{1/2}$

12) $y = \sin(\cos^2 5x)$

13) $y = (2\cos 2x + 5)^4$

14) $y = \sin(2x + \pi)$

15) $y = \sin^3(4x-1)$

16) $y = 7x^2 \cos 3x$

17) $y = 14x^5(x^2+3)^6$

- 2)
- 1) $y = (3x^2 + 5)^5$ becomes $y = X^5$ if we put $X = 3x^2 + 5$. Use the chain rule to find the derivative of y .
 - 2) $y = \sin\left(3t + \frac{\pi}{2}\right)$ becomes $y = \sin X$ if we put $X = 3t + \frac{\pi}{2}$. Use the chain rule to find the derivative of y .
 - 3) $y = e^{x^2+2}$ becomes $y = e^X$ if we put $X = x^2 + 2$. Use the chain rule to find the derivative of y .
 - 4) $y = \ln(2t^2 + 3t)$ becomes $y = \ln X$ if we put $X = 2t^2 + 3t$. Use the chain rule to find the derivative of y .

5) Differentiate each of these functions with respect to the letter used in their description.

1) $y = (2x^2 + 3)^4$

2) $v = (t^5 - 2)^5$

3) $y = (-3x^2 - 2x)^7$

4) $u = (3t - 1)^{2/3}$

5) $y = \cos\left(4t + \frac{\pi}{3}\right)$

6) $y = \sin(x^2)$

7) $y = \sin t - \sin 2t$

8) $y = 4 \ln 5x$

9) $y = \cos(3x^2 + \pi)$

10) $y = \sin^2 x$

11) $y = \sin(2x^2 - 2)$

6) Find dy :

1) $y = (x^2 - 2x + 5)^{11}$

2) $y = \sin 2x$

3) $y = \cos(x^2)$