

Calculus Worksheet
Chain Rule Practice #1

Find the derivative of each of the following functions.

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

2. $y = \tan 3x$

3. $f(x) = (x^3 - 5x)^4$

4. $y = 4 \sec 5x$

5. $f(x) = (3x - 2)^{10} (5x^2 - x + 1)^{12}$

6. $y = \cos(x^3)$

7. $f(x) = (6x^2 + 5)^3 (x^3 - 7)^4$

8. $y = \cos^3 x$

9. $y = (2x^2 - 6x + 1)^{-8}$

10. $f(x) = (1 + \cos^2 x)^6$

Chain Rule Practice #1 Answers

$$1. y' = 10(x+2)(x^2 + 4x + 6)^4$$

$$2. f'(x) = 4(3x^2 - 5)(x^3 - 5x)^3$$

$$3. f'(x) = 6(3x - 2)^9(5x^2 - x + 1)^{11}(85x^2 - 51x + 9)$$

$$4. f'(x) = 12x(6x^2 + 5)^2(x^3 - 7)^3(9x^3 + 5x - 21)$$

$$5. y' = -16(2x - 3)(2x^2 - 6x + 1)^{-9} \text{ or } y' = \frac{-16(2x - 3)}{(2x^2 - 6x + 1)^9}$$

$$6. y' = \frac{1}{2}(2x - 7)(x^2 - 7x)^{-\frac{1}{2}} \text{ or } y' = \frac{(2x - 7)}{2\sqrt{x^2 - 7x}}$$

$$7. y' = -8(x - 1)(x^2 - 2x - 5)^{-5} \text{ or } y' = \frac{-8(x - 1)}{(x^2 - 2x - 5)^5}$$

$$8. f'(x) = \frac{3}{2}\left(x - \frac{1}{x}\right)^{\frac{1}{2}}\left(1 + \frac{1}{x^2}\right)$$

$$9. y' = \frac{39(x - 6)^2}{(x + 7)^4}$$

$$10. y' = \frac{-2}{\sqrt[5]{(2x - 1)^6}}$$

Calculus Worksheet
Chain Rule Practice #2

Find the derivative of each of the following functions.

1. $y = \sqrt{x^2 - 7x}$

2. $y = \tan(x^2) + \tan^2 x$

3. $y = \frac{1}{(x^2 - 2x - 5)^4}$

4. $y = \cos(\tan x)$

5. $f(x) = \left(x - \frac{1}{x}\right)^{\frac{3}{2}}$

6. $y = \sin^3 x + \cos^3 x$

7. $y = \left(\frac{x-6}{x+7}\right)^3$

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

9. $y = \frac{1}{\sqrt[5]{2x-1}}$

10. $y = \frac{\sin^2 x}{\cos x}$

11. $y = \sin^3(2x + 3)$

Chain Rule Practice #2 Answers

1. $y' = 3\sec^2 3x$

2. $y' = 20\sec 5x \tan 5x$

3. $y' = -3x^2 \sin(x^3)$

4. $y' = -3\sin x \cos^2 x$

5. $f'(x) = -12\cos x \sin x(1 + \cos^2 x)^5$

6. $y' = 2x\sec^2(x^2) + 2\tan x\sec^2 x$

7. $y' = -\sec^2 x \sin(\tan x)$

8. $y' = 3\sin^2 x \cos x - 3\cos^2 x \sin x$

9. $y' = -8\sin 4x \sin(\cos(4x))\cos(\cos 4x)$

10. $y' = \frac{2\sin x \cos^2 x + \sin^3 x}{\cos^2 x}$

11. $y' = 6\cos(2x + 3)\sin^2(2x + 3)$