

Find the derivatives using the Product Rule:

$$f(x) = 3x^2 \sin x \quad g(x) = (\sin x)(\tan x) \quad h(x) = 5x^3 \cos x + 3x^2 \tan x$$

$$f'(x) = 6x \sin x + 3x^2 \cos x \quad g'(x) = (\cos x)(\tan x) + (\sin x)(\sec^2 x)$$

$$h'(x) = 15x^2 \cos x - 5x^3 \sin x + 6x \tan x + 3x^2 \sec^2 x$$

Find the derivatives using the Quotient Rule:

$$f(x) = \frac{4x^2 + x - 2}{5x^2 + 3} \quad g(x) = \frac{-6x^2 + 5 \cot x}{3 \tan(x) + 12/x} \quad h(x) = 17x^2 + 13x + \frac{3x^5}{\cos x}$$

$$f'(x) = \frac{(5x^2 + 3)(8x + 1) - (4x^2 + x - 2)(10x)}{(5x^2 + 3)^2}$$

$$g'(x) = \frac{(3 \tan(x) + 12/x)(-12x - 5 \csc^2 x) - (-6x^2 + 5 \cot x)(3 \sec^2 x - 12/x^2)}{(3 \tan(x) + 12/x)^2}$$

$$h'(x) = 34x + 13 + \frac{(\cos x)(15x^4) - (3x^5)(-\sin x)}{\cos^2 x}$$

Find the derivatives using the Chain Rule:

$$f(x) = \sin(5x^2+1) \quad g(x) = \frac{1}{2x^3 + \cos x} \quad h(x) = (3x^2+2 \sin x)^5$$

$$f'(x) = \cos(5x^2 + 1) (10x) \quad g'(x) = \frac{6x^2 - \sin x}{(3x^3 + \cos x)^2}$$

$$h'(x) = 5(3x^2 + 2 \sin x)^4(6x + 2 \cos x)$$

Find the derivatives of the following functions:

$$1) \sin \left((3x^2 + 1) \left(17 + \frac{2}{x^2} \right) \right) \quad 2) \cos \left(\frac{5x^4 + 2\sqrt{x}}{2x^4 - 3x + 1} \right) \quad 3) 12x^3 \sqrt{7x^2 - 2x}$$

$$4) \frac{\sin(2x^5 - 3x^{5/2} + 2)}{2x^2 + \tan x} \quad 5) \frac{7x^2 - (2x - 1) \sin x}{12 \sec x} \quad 6) \cos \left(\sqrt{7x^2 - 3x + 1} \right)$$

$$7) \left(\frac{\sin(7x^2 + x)}{\cos(3x - 1)} \right)^{13}$$

$$1) \cos \left((3x^2 + 1) \left(17 + \frac{2}{x^2} \right) \right) \left((6x) \left(17 + \frac{2}{x^2} \right) + (3x^2 + 1) \left(-\frac{4}{x^3} \right) \right)$$

$$2) -\sin \left(\frac{5x^4 + 2\sqrt{x}}{2x^4 - 3x + 1} \right) \left(\frac{(20x^3 + x^{-1/2})(2x^4 - 3x + 1) - (5x^4 + 2\sqrt{x})(8x^3 - 3)}{(2x^4 - 3x + 1)^2} \right)$$

$$3) 36x^2 \sqrt{7x^2 - 2x} + 12x^3 \frac{1}{2} (7x^2 - 2x)^{-1/2} (14x - 2)$$

$$4) \frac{(2x^2 + \tan x) \cos(2x^5 - 3x^{5/2} + 2)(10x^4 - \frac{15}{2}x^{3/2}) - \sin(2x^5 - 3x^{5/2} + 2)(4x + \sec^2 x)}{(2x^2 + \tan x)^2}$$

$$5) \frac{(12 \sec x)(14x - (2) \sin x - (2x - 1) \cos x) - (7x^2 - (2x - 1) \sin x)(12 \sec x \tan x)}{(12 \sec x)^2}$$

$$6) -\sin \left(\sqrt{7x^2 - 3x + 1} \right) \left(\frac{1}{2} (7x^2 - 3x + 1)^{-1/2} \right) (14x - 3)$$

$$7) 13 \left(\frac{\sin(7x^2 + x)}{\cos(3x - 1)} \right)^{12} \left(\frac{\cos(3x - 1) \cos(7x^2 + x)(14x + 1) - \sin(7x^2 + x)(-\sin(3x - 1)) (3)}{\cos^2(3x - 1)} \right)$$