Product Rule

$$(fg)' = f'g + fg'$$

$$\left(\frac{f}{g}\right)' = \frac{gf' - fg'}{g^2}$$

Sep 19-2:15 PM

2.3

6. $g(x) = \sqrt{x}\sin x = (x^{1/2})(\sin x)$

$$g'(x) = (x^{1/2})'(\sin x) + (x^{1/2})(\sin x)'$$

$$= \frac{1}{2}x^{-1/2}\sin x + x^{1/2}\cos x$$

$$= \frac{\sin x}{2\sqrt{x}} + \sqrt{x}\cos x$$

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12. $f(t) = \dfrac{\cos t}{t^3} = t^{-3}\cos t$

$$f'(t) = \frac{t^3(\cos t)' - \cos t\,(t^3)'}{(t^3)^2}$$

$$= \frac{-t^3\sin t - 3t^2\cos t}{t^6}$$

$f'(t) = (t^{-3})(-\sin t) + (-3t^{-4})(\cos t)$

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26. $f(x) = \dfrac{x^3+3x+2}{x^2-1}$ (f / g)

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

(g, f, $-$, f, g', g^2)

$$= \frac{(x^2-1)(3x^2+3) - (x^3+3x+2)(2x)}{(x^2-1)^2}$$

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The Chain Rule

section 2.4

$$[f(g(x))]' = f'(g(x)) \cdot g'(x) \cdot x'$$

$$[f(g(h(x)))]' = f'(g(h(x))) \cdot g'(h(x)) \cdot h'(x) \cdot x'$$

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$f(x) = \sin(x^5 - 3x^2)$

$f'(x) = [\cos(x^5 - 3x^2)] \cdot (5x^4 - 6x)$

$f(x) = 3\cos^2 x = 3[\cos x]^2$

$f'(x) = 6\cos x \cdot (-\sin x)$

$= -3\sin 2x$

$\sin 2x = 2\sin x \cos x$

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$f(x) = \cos(5\sin 7x)$

$\cos u$

$u = 5\sin v$

$v = 7x$

$f'(x) = -\sin(5\sin 7x) \cdot 5\cos 7x \cdot 7$

$f(x) = \sqrt{3\cos(4x^2-3x)} = [3\cos(4x^2-3x)]^{1/2}$

$u^{1/2}$

$3\cos v$

$v = 4x^2-3x$

$f'(x) = \frac{1}{2}(3\cos(4x^2-3x))^{-1/2} \cdot (-3\sin(4x^2-3x)) \cdot (8x-3)$

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$f(x) = (5x)(\sin(x^2))$

$f'g + fg' = fg' + fg'$

$f'(x) = 5x(\sin(x^2))' + (5x)'\sin(x^2)$

$= 5x(\cos(x^2)\cdot 2x) + (5)\sin(x^2)$

$f(x) = 5\sin(3\cos 2x^5)$

$5\sin u$

$u = 3\cos v$

$v = 2x^5$

$f'(x) = 5\cos(3\cos 2x^5)\cdot(-3\sin 2x^5)\cdot(10x^4)$

$f(x) = \tan x = \frac{\sin x}{\cos x}$

$f'(x) = \frac{\cos x(\sin x)' - \sin x(\cos x)'}{\cos^2}$

$= \frac{\cos^2 x - \sin x(-\sin x)}{\cos^2 x} = \frac{\cos^2 x + \sin^2 x}{\cos^2 x} = \frac{1}{\cos^2 x} = \sec^2$

Sep 19-2:43 PM

$(\tan x)' = \sec^2 x$

$(\cot x)' = -\csc^2 x$

$(\sec x)' = \sec x \tan x$

$(\csc x)' = -\csc x \cot x$

$(\sin x)' = \cos x$

$(\cos x)' = -\sin x$

2.3 & 2.4 some product quotient & chain

Sep 19-2:53 PM