D1st, 2nd + D2nd, 1st

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Use the product rule to differentiate.

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

$f'(x) = 6(x^3-2) + (3x^2)(6x+5)$

$= 6x^3 - 12 + 18x^3 + 15x^2$

$= 24x^3 + 15x^2 - 12$

(6) $g(x) = \sqrt{x}\sin x$

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

$= \frac{1}{2\sqrt{x}}\sin x + \sqrt{x}\cos x$

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

$g(x) = \frac{a}{b}$

$g'(x) = \frac{b\cdot a' - a\cdot b'}{(b)^2}$

Use the quotient rule to differentiate.

(8) $g(t) = \frac{t^2+4}{5t-3}$ $g'(t) = \frac{(5t-3)(2t) - (t^2+4)5}{(5t-3)^2}$

$= \frac{10t^2 - 6t - 5t^2 - 20}{(5t-3)^2}$

$= \frac{5t^2 - 6t - 20}{(5t-3)^2}$

Find $f'(x)$ and $f'(c)$.

(18) $f(x) = \frac{\sin x}{x}$ at $c = \pi/6$

$f'(x) = \frac{x\cdot\cos x - (1)\sin x}{x^2}$ $= \frac{\pi/6\cos\pi/6 - \sin\pi/6}{(\pi/6)^2}$

$= \frac{\frac{\pi}{6}\cdot\frac{\sqrt{3}}{2} - \frac{1}{2}\left(\frac{6}{6}\right)}{\frac{\pi^2}{36}}$

$= \frac{\pi\sqrt{3} - 6}{12} \cdot \frac{36}{\pi^2} = \frac{3(\sqrt{3}\pi - 6)}{\pi^2}$

1

Find the derivative.

(44) $y = x + \cot x$ $\quad y' = 1 - \csc^2 x$ OR $-\cot^2 x$

(54) $h(\theta) = 5\theta \sec\theta + \theta \tan\theta$

$= 5\sec\theta + 5\theta \sec\theta \tan\theta + \tan\theta + \theta \sec^2\theta$

(60) $f(x) = \tan x \cot x$

$= \tan x \cdot \frac{1}{\tan x}$

$= 1$

$f'(x) = 0$

★ $y = \tan x$ $\quad f(x) = \sec x$

$y' = \sec^2 x$ $\quad f'(x) = \sec x \tan x$ ★

$y = \cot x$

$\frac{dy}{dt} = -\csc^2 x$

$y = \csc x$

$y' = -\csc x \cot x$