9 Wednesday, September 13

Theorem (Quotient Rule)**.**

$$\frac{d}{dx}\left[\frac{f}{g}\right] = \frac{g\frac{df}{dx} - f\frac{dg}{dx}}{g^2}$$

Theorem (Derivatives of Trigonometric Functions)**.**

(1) $\dfrac{d}{dx}\left[\tan x\right] = \sec^2 x$

(2) $\dfrac{d}{dx}\left[\sec x\right] = \sec x \tan x$

(3) $\dfrac{d}{dx}\left[\cot x\right] = -\csc^2 x$

(4) $\dfrac{d}{dx}\left[\csc x\right] = -\csc x \cot x$

Example. Find the derivative.

(1) $y = \dfrac{2x+5}{2x-3}$

(2) $y = \dfrac{t^2-1}{t^2+1}$

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

(4) $s = \dfrac{t^2-1}{t^2+t-2}$

(5) $r = \dfrac{\sqrt{s}-1}{\sqrt{s}+1}$

(6) $u = \dfrac{5x+1}{2\sqrt{x}}$

(7) $y = \dfrac{\cos x}{x} + \dfrac{x}{\cos x}$

(8) $y = \dfrac{1}{(x^2 + x + 1)e^x}$

(9) $s = \dfrac{1 + \csc t}{1 - \csc t}$

(10) $s = \dfrac{\sin t}{1 - \cos t}$

(11) $y = \dfrac{\sin x + \cos x}{\cos x}$

(12) $y = \dfrac{x^3 \cos x}{e^x}$