Definition of a Derivative

Given f(x), it's derivative is:

$$\frac{f(x+h)-f(x)}{h}$$

Find the derivatives of the following:

1. $10x^2 - x$
2. $\frac{1}{\sqrt{x}}$

Derivative Formulas

Find the derivative of the following functions:

1. $10x^5 + 13x^3 + 2x^2 + 5x + 1$
2. $\frac{1}{\sqrt{x}}$
3. $x^{\frac{5}{3}} + x^{\frac{1}{2}}$
4. $\frac{x+\sqrt{x}}{\sqrt[3]{x}}$

Find the derivative of the following using the product rule:

1. $(5x^2+1)(3x+1)$
2. $x^2 \sin x$
   (The derivative of $\sin x$ is $\cos x$)
3. $(\frac{1}{x^2}+\frac{2}{x^4})(3x^2+4x)$
4. $(5x+4x^2)^2$

Find the derivative of the following using the quotient rule:

1. $\frac{x+1}{x-1}$
2. $\frac{2x}{4\sqrt{x}+3}$
3. $\tan x$
   (The derivative of $\cos x$ is -$\sin x$)
4. $\frac{x}{x^3-8}$

Trig Functions

$\frac{d}{dx}\ \sin x = \cos x \qquad \frac{d}{dx}\ \cos x = \text{-}\sin x$

Find the derivative of the functions:

1. $\tan x$
2. $\csc x$
3. $\cot x$
4. $\sec x$