Derivatives of Simple Functions.

- **Constant Functions**: c (not depending on x). Examples $f(x) = 5$, $g(x) = e$, $h(x) = \ln(2)$.

  $\frac{d}{dx}\, c \;\; =$

- **Power Functions**: x^a. Examples: x^3, $x^{2/3} = \sqrt[3]{x^2}$, $x^{-4} = 1/x^4$.

  $\frac{d}{dx}\, x^a \;\; =$

- **Natural Exponential and Logarithm Functions**:

  $\frac{d}{dx}\, e^x \;\; =$

  $\frac{d}{dx}\, \ln x \;\; =$

- **Trigonometric Functions**:

  $\frac{d}{dx}\, \sin x \;\; =$

  $\frac{d}{dx}\, \cos x \;\; =$

  $\frac{d}{dx}\, \tan x \;\; =$

- **Inverse Trigonometric Functions**:

  $\frac{d}{dx}\, \arcsin x \;\; =$

  $\frac{d}{dx}\, \arctan x \;\; =$

Differentiation Rules. Suppose a and b are constants and f and g are differentiable functions.

- **Constant Multiple Rule, Sum and Difference Rules**:

  $\frac{d}{dx}\, (af(x) \pm bg(x)) \;\; =$

- **Product and Quotient Rules**:

  $\frac{d}{dx}\, f(x) \cdot g(x) \;\; =$

  $$\frac{d}{dx}\, \frac{f(x)}{g(x)} \;\; =$$

- **Chain Rule**:

  $\frac{d}{dx}\, f(g(x)) \;\; =$

Simple Antiderivatives.

- **Constant Functions**: c (not depending on x),

  $\int c\, dx \;\; =$

- **Some Power Functions**: $x^a \quad (a \neq -1)$,

  $\int x^a\, dx \;\; =$

- **Natural Exponential Function**:

  $\int e^x\, dx \;\; =$

- **The Reciprocal Function**: $1/x = x^{-1}$

  $\int \frac{1}{x}\, dx \;\; =$

- **Trigonometric Functions**:

  $\int \sin x\, dx \;\; =$

  $\int \cos x\, dx \;\; =$

  $$\int \frac{1}{\cos^2 x}\, dx \;\; =$$

- **Derivatives of Inverse Trigonometric Functions**:

$$\int \frac{1}{\sqrt{1-x^2}}\,dx \;=$$

$$\int \frac{1}{1+x^2}\,dx \;=$$

Basic Substitution (Undoing the Chain Rule): $\int f(u(x))\,u'(x)\,dx \;=\; \int f(u)\,du$

- $\int (3x+4)^8\,dx \;=$

- $\int \frac{1}{1-x}\,dx \;=$

- $\int \frac{1}{(2x+1)^2}\,dx \;=$