

Review (HW #1)

Derivatives

The derivative of $f(x)$ can be denoted using Newton's notation as _____

or using Leibniz's notation as _____.

The derivative at $x = a$ is denoted using Newton's notation as _____

or using Leibniz's notation as _____.

Graphically, the derivative represents _____.

Intuitively, the derivative represents _____.

Using a limit, the definition of the derivative is _____.

The derivative rules are:

The linearity properties:

a) $(f + g)'(x) =$ _____

b) If k is a constant, then $(kf)'(x) =$ _____

The Power rule: $\frac{dx^r}{dx} =$ _____

The Product rule: $(f \cdot g)'(x) =$ _____

The Quotient rule: $\left(\frac{f}{g}\right)'(x) =$ _____

The Chain rule: $(f \circ g)'(x) =$ _____

" \implies " means "implies."

Fill in the blanks. k is a constant.

$$f(x) = k \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \sec(x) \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = e^x \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \cot(x) \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = k^x \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \csc(x) \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \ln(x) \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \sin^{-1}(x) \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \int_k^x g(t) dt \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \arccos(x) \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \sin(x) \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \sinh(x) \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \cos(x) \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \cosh(x) \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \tan(x) \implies f'(x) = \underline{\hspace{2cm}}$$

$$f(x) = \arctan(x) \implies f'(x) = \underline{\hspace{2cm}}$$

Integration

The definition of the definite integral of $f(x)$ from a to b is

Graphically, the definite integral above represents _____.

Intuitively, the definite integral represents _____.

The Fundamental Theorem of Calculus is _____.

The indefinite integral of $f(x)$ is denoted by _____.

The indefinite integral of $f(x)$ is _____.

Integration properties to remember:

1) The integral is a linear operator just like derivatives. What does that mean?

$$2) \int_{-k}^k f(x) dx = \begin{cases} 0 & \text{if } f \text{ is odd} \\ 2 \int_0^k f(x) dx & \text{if } f \text{ is even} \end{cases}$$

3) If $M \leq f(x) \leq N$ for $a \leq x \leq b$, then $M(b-a) \leq \int_a^b f(x) dx \leq N(b-a)$.

4) The definite integral of $\cos(kx)$ or $\sin(kx)$ over an interval with length equal to the period is zero. What is the period of $\cos(kx)$?