

Review of Chapter 5: Exp and Log functions

Keywords: Exp and Log

1. Exponential functions

- Exponential function with base b : $y = b^x$.
- The laws of exponents.
- Basic properties of Exp functions (domain, range, special values, continuity, and monotonicity).
- $e = \lim_{m \rightarrow \infty} \left(1 + \frac{1}{m}\right)^m = 2.7\dots$ and function $y = e^x$.
- Differentiation: $\frac{d}{dx}(e^x) = e^x$
- Chain rule: $\frac{d}{dx}(e^{f(x)}) = e^{f(x)} f'(x)$

2. Logarithmic functions

- Logarithmic function with base b : $y = \log_b x$
if and only if $b^y = x$.
- The laws of logarithms.
- Basic properties of Log functions (domain, range, special values, continuity, and monotonicity).
- Common logarithmic function: $y = \log x$.
Natural logarithmic function: $y = \ln x$.
- Differentiation: $\frac{d}{dx}(\ln |x|) = \frac{1}{x}$
- Chain rule: $\frac{d}{dx}(\ln f(x)) = \frac{1}{f(x)} f'(x)$
- Logarithmic differentiation.

3. Relations between Exp functs and Log functs

- $e^{\ln x} = x$
- $\ln e^x = x$

4. Applications — Compound interest

- Exponential growth and decay.
- Learning curves.
- Logistic growth functions.