# Functions in One Variable $\mathbb{R} \to \mathbb{R}$

Function $\begin{cases} \text{Domain, Range, Graph} \\ \text{Composition of Functions} \\ \text{Inverse Function} \end{cases}$

Limit and Continuity $\begin{cases} \text{``}\varepsilon, \delta\text{'' Definitions} \\ \text{Limit, Basic Techniques, Application: Asymptote} \\ \text{Continuity} \to \text{Intermediate Value Theorem } (\Rightarrow \text{ Bisection Method}) \end{cases}$

Differentiation $\begin{cases} \text{Definition of Derivative, Product/Quotient rule} \\ \text{Derivatives of Basic Functions } (power\ fnt,\ exponential, logarithmic, trig\ functions) \\ \text{Differential} \begin{cases} \text{Chain rule} \\ \text{Derivative of inverse function} \\ \text{Linear Approximation} \end{cases} \\ \text{Concavity, Extrema, Graph} \\ \text{L'Hôpital's Rule} \begin{cases} \text{Rolle's Theorem} \\ \text{Mean Value Theorems} \\ \text{Convert to } \frac{0}{0} \text{ or } \frac{\infty}{\infty} \text{ form to apply} \end{cases} \end{cases}$

Integration $\begin{cases} \text{Anti-derivative/Indefinite Integral and Techniques} \\ \big(Substitution,\ Integration\ by\ Parts,\ Partial\ Factions,\ \cdots\ \big) \\ \text{Definite Integral} \begin{cases} \text{Riemann Sum, Definite Integral, Fundamental Theorem of Calculus} \\ Limit\ of\ Finite\ Sum \longleftrightarrow Definite\ Integral \\ \text{Applications of Definite Integral } \big(Area,\ Arc\ Length, \\ \quad \text{Volume and Surface Area Of Revolution, Center Of Mass, Inertia}\big) \end{cases} \\ \text{Improper Integral} \end{cases}$