1 | Calculating Derivatives unit1::derivatives

1.1 | Types of Formulas

Two kinds of formulas, specific (for specific functions) and general. Both are needed to solve polynomials.

1.2 | Derivative of sin(x)

This only works with radians! Loose summary of derivation:

- $\lim_{x \to 0} \frac{sin(x+\Delta x)-f(x)}{\Delta x}$
- Use trigonometric identities to expand the $sin(x+\Delta x)$ term. $sin(a+b) = sin(a)cos(b)+cos(a)+sin(b)$.
- Group the terms by plugging in the derivative at $x = 0$ such that the resulting quotients end up cancelling.

$sin(x)\left(\frac{cos(\Delta x)-1}{\Delta x}\right) + cos(x)\left(\frac{sin(\Delta x)}{\Delta x}\right)$ Right side's quotient goes to 1, left side goes to 0, so the entire equation goes to $cos(x)$ The derivatives of sin and cosine at $x = 0$ give all values of the derivative of sine and cosine.

1.3 | Derivative of cos(x)

Similar derivation to above which yields $-sin(x)$.

1.4 | Some General Rules

- Product rule: $(uv)' = u'v + uv'$
- Quotient rule: $(\frac{u}{v})' = \frac{u'v-uv'}{v^2}$

2 | Links

Differentiation Rules builds upon this.