Polynomial Regression & Basis Expansion

Key Insight

Linear models can fit non-linear relationships

Transform Features:

$$x \longrightarrow x, x^2, x^3, \ldots$$

Example Equation:

$$y = \beta_0 + \beta_1 x + \beta_2 x^2 + \beta_3 x^3$$

✓ Still "linear" in parameters (coefficients)

⚖ **Trade-off:** Model flexibility vs. overfitting risk

🎯 Choosing polynomial degree: validation approach

f(x) **Other basis functions:**
Logarithmic, Exponential, Trigonometric

Extends Linear Regression Capabilities

📊 Interactive Polynomial Regression Simulator

Explore polynomial regression with different degrees using Desmos!

Launch Interactive Simulator →