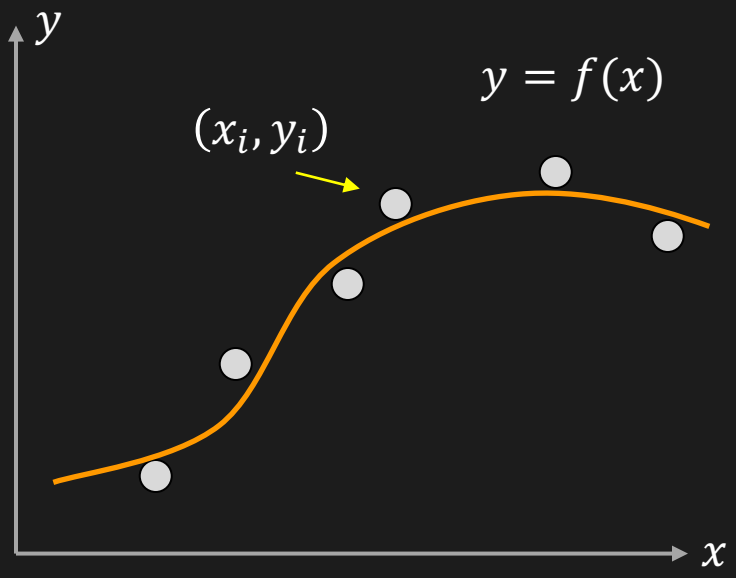
Fitting Curves to Edges

Given: Edge Points (x_i, y_i)

Task: Find polynomial

$$y = f(x) = ax^3 + bx^2 + cx + d$$

that best fits the points



Minimize:

$$E = \frac{1}{N}\sum_i (y_i - ax_i{}^3 - bx_i{}^2 - cx_i - d)^2$$

Solve the Linear System Using Least Squares Fit by:

$$\frac{\partial E}{\partial a} = 0 \qquad \frac{\partial E}{\partial b} = 0 \qquad \frac{\partial E}{\partial c} = 0 \qquad \boxed{\frac{\partial E}{\partial d} = 0}$$

Closed-form solution cumbersome when unknowns are many