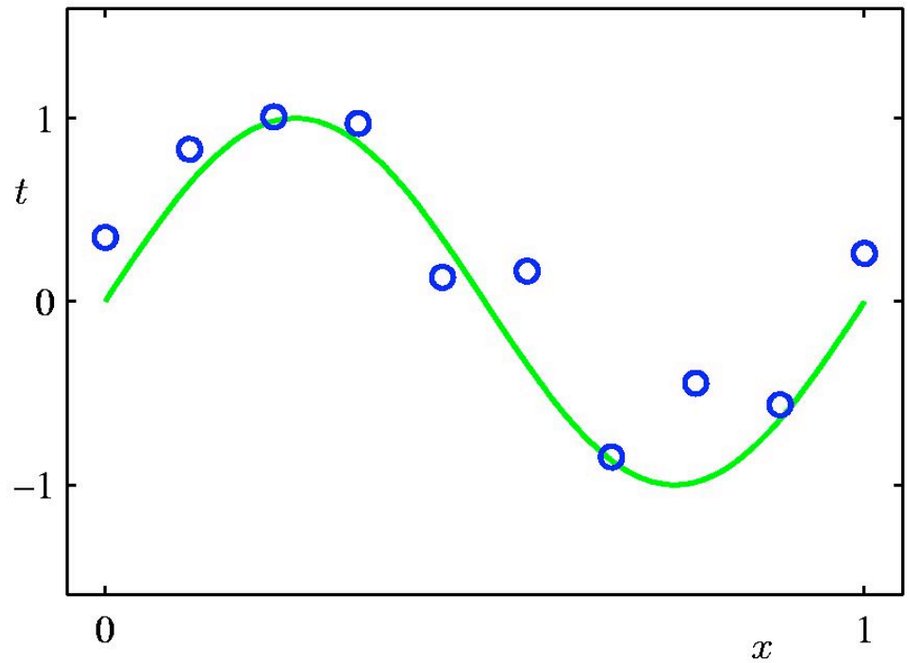
Group Homework 1

- *Polynomial Regression using ML*
  - Two random variables X and Y
  - A dataset of examples
    $$D = \{(X_1, Y_1), \ldots, (X_n, Y_n)\}$$
  - A parametric model of the form
    $$y = f(x; \Theta) + \epsilon \text{ where } \epsilon \sim N(0, \sigma^2)$$
  - Concretely, $f(x; \Theta) = \sum_{i=0}^{K} \theta_i x^i$
  - where the data is distributed as $P_{Z|X}(D|x; \Theta) = G(z, f(x; \Theta), \sigma^2)$
  - Show that $\Theta^* = [\Gamma^T \Gamma]^{-1} \Gamma^T y$ where
- GROUP I (for next class)



$$\Gamma = \begin{bmatrix} 1 & \cdots & x_1^K \\ \vdots & \vdots & \vdots \\ 1 & \cdots & x_n^K \end{bmatrix}$$