

Function Fitting

(11.1) 100 uniform points from (0-1). $y = 2 - 3x + \xi$

↑
Gaussian random
variable
with std. dev 0.5

SVD to fit $y = a + bx$ to data.

Find error a, b for

$$\text{col } \frac{\sigma_{r,i}^2}{\sigma_{\xi}^2} = \sum_j \frac{V_{ij}^2}{w_j^2}$$

Recall SVD:

$$[A] = [U] \left[\begin{array}{ccc} w_1 & & 0 \\ & w_2 & \\ 0 & & \dots \\ & & & w_M \end{array} \right] [V^T]$$

$M \times N$ $M \times M$ $M \times N$ $N \times N$

$$y = a_0 + a_1 x \Rightarrow a_0 + a_1 x - y = e$$

$$\begin{bmatrix} 1 & x_1 & y_1 \\ \vdots & \vdots & \vdots \\ 1 & x_2 & y_2 \\ \vdots & \vdots & \vdots \\ 1 & x_N & y_N \end{bmatrix} \begin{bmatrix} a_0 \\ a_1 \\ c \end{bmatrix} \approx \begin{bmatrix} 0 \\ 0 \\ \vdots \\ 0 \end{bmatrix}$$

$M < N$

(3+100)