

## Exercise 10 Problem 1

First find out mean and variance of raw data:

$$\bar{x} = 29.20$$

$$\text{var}(x) = 23.33$$

Scale the data to the distribution of the Gaussian process

Given parameters

$$\mu = 3.7, \sigma^2 = 76.6$$

Scaling  $x \rightarrow x'$

$$x' = \frac{(x - \bar{x})}{\sqrt{\text{var}(x)}} \cdot \sigma + \mu$$

Scaled data points

$$x' = \left\{ \begin{array}{l} -9.4370, \\ 1.8630, \\ 2.8829, \\ 7.3101, \\ 18.4989, \\ -11.9478, \\ 7.4232, \\ 8.2021, \\ 18.6618, \\ -1.9206, \\ 5.0511, \\ 17.1444, \\ 12.6668, \\ -2.3480, \\ 10.9805, \\ 4.0849, \end{array} \right.$$

$$\left\{ \begin{array}{l} -4.2336, \\ -6.1346, \\ -3.5464, \\ -1.2017 \end{array} \right\}$$

$$\bar{x}' = 3.6999$$

$$\text{var}(x') = 76.6$$

$$\text{Calculate } \chi^2 = \sum_i \frac{(x_i' - \bar{x}')^2}{\text{var}(x')^2} \\ = 20.0$$

Degrees of freedom

$$\begin{aligned} v &= N - M \\ &= 20 - 2 \quad (\text{parameters } \mu, \sigma) \\ &= 18 \end{aligned}$$

Since  $\chi^2 \approx v$ , the model  
assuming  $\mu$  and  $\sigma$  is a good  
fit with the data.