
PRACTICE 9

EXERCISE 1: VALIDATION

Generate the following data:

```
rand('seed', 0);  
randn('seed', 0);  
x = rand(1,100);  
y = exp(x.^3 - x.^2 + 0.01*x + 2) + 0.04 * randn(size(x));
```

Want to perform a regression model for the data. We assume unknowing the origin of the data x, y . Since we do not know the origin of the data, you have to calculate the generalization error for the following models:

- A polynomial of degree 1
- A polynomial of degree 2
- A polynomial of degree 3
- A linear model as $y = a + bx + cx^2 + dx^3 + e \cdot \sin(x)$
- A linear model as $y = a + bx + cx^2 + dx^3 + e \cdot \sin(x) + f \cdot \sin(x)$

Use the following validation methods:

- **Simple validation method** iterated 1000 times, with a 70% to estimate the parameters and a 30% for estimating the generalization error.
- **Cross validation method** of order 10.
- **Leave – One – Out** method.