

assignment07

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1 This is assignment07

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4 Link:<https://github.com/pcyyyy/assignment07.git>

5 Import packages:


```
In [1]: import numpy as np
import matplotlib.pyplot as plt
```

6 Give data and define function

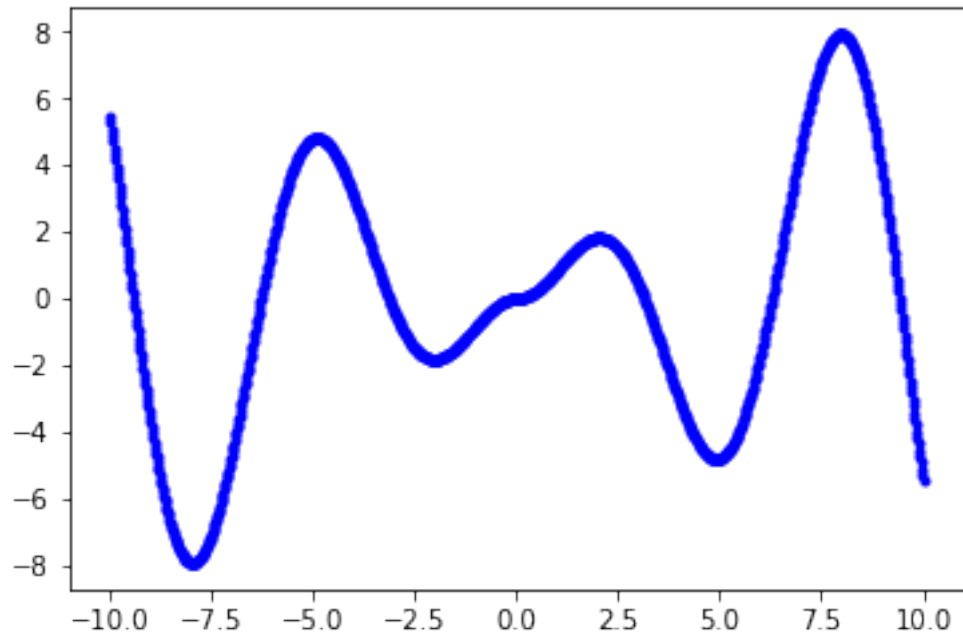
```
In [2]: num      = 1001
std       = 5
def fun(x):
    f = np.abs(x) * np.sin(x)
    return f
n        = np.random.rand(num)
nn       = n - np.mean(n)
x        = np.linspace(-10,10,num)
y1       = fun(x)
y2       = y1 + nn * std
```

7 Plot the noisy data (x,y1)

```
In [6]: plt.plot(x, y1, 'b.')
```

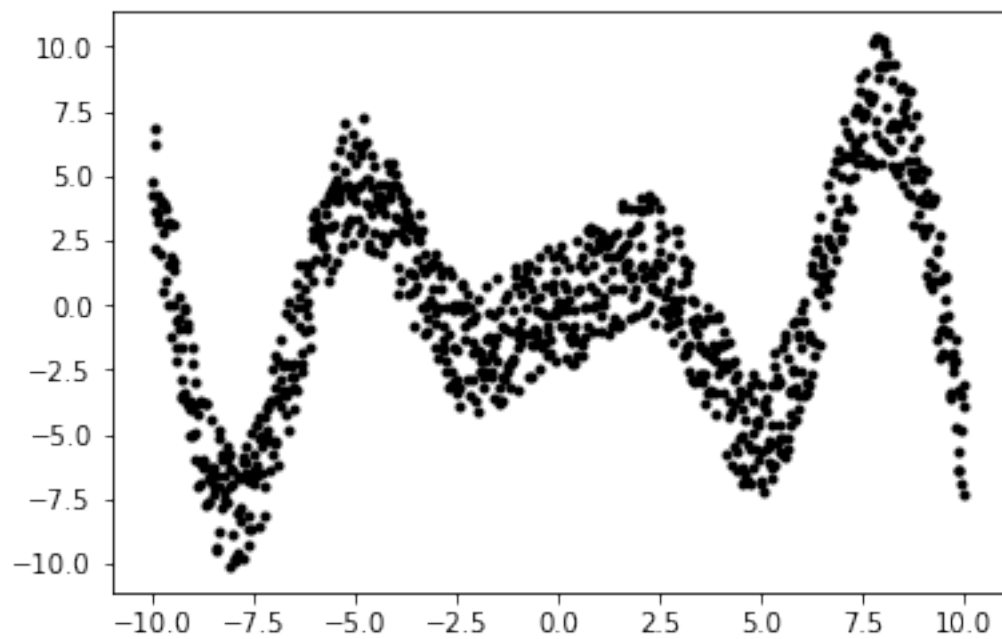


```
plt.show()
```



8 Plot the clean data (x,y2)

```
In [7]: plt.plot( x, y2, 'k.')  
plt.show()
```



9 Compute the optimal set A of model parameters

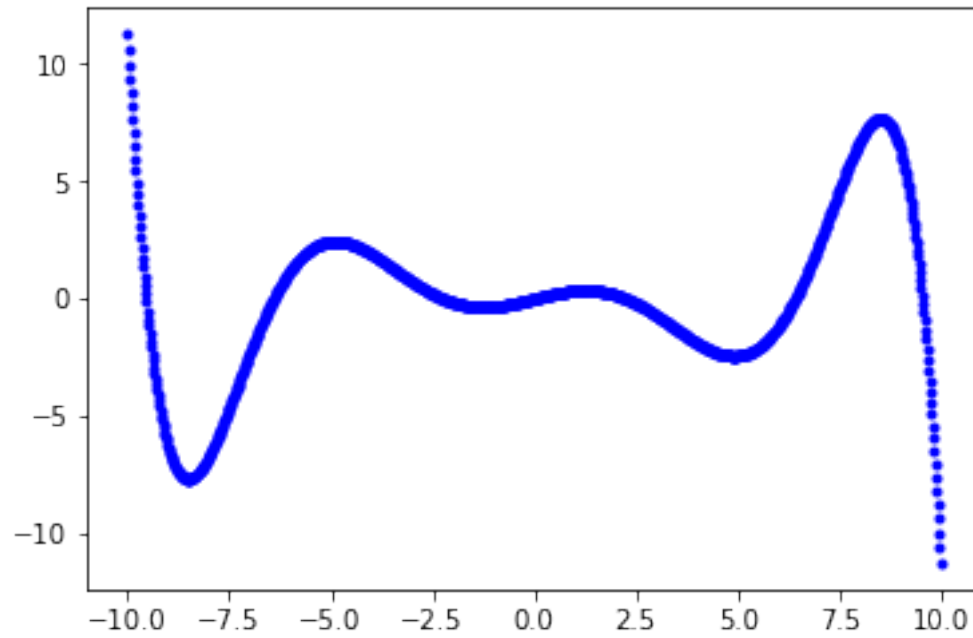
```
In [10]: xa=[]
         ya=[]
         for i in range(0,9):
             xa.append(x**i)
         xa=np.array(xa)
         xA=xa.T
         ya=np.array(y1)
         y=ya.reshape(num,1)
         A1=np.linalg.inv((xA.T).dot(xA))
         A2=(xA.T).dot(y)
         A=(A1).dot(A2)
         print(A)
```

```
[[ 8.79006555e-12]
 [ 4.36909750e-01]
 [-2.83832640e-12]
 [-1.01414214e-01]
 [ 1.45984778e-13]
 [ 3.14903901e-03]
 [-2.41596468e-15]
 [-2.29143441e-05]
 [ 1.25077452e-17]]
```

10 Define the polynomial function and plot the curves

```
In [11]: Y=(xA).dot(A)
         plt.plot(x, Y, 'b.')
```

```
Out[11]: [<matplotlib.lines.Line2D at 0x248b2296f98>]
```



11 Plot the error

```
In [14]: r=y1-Y  
         rr=sum(r**2)  
         plt.plot(x, rr, 'k.')
```

```
Out[14]: [<matplotlib.lines.Line2D at 0x248b383dcc0>]
```

