Assignment07

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https://github.com/criticaster/assignment07

In [2]:
```
###  assignment07.py  ###

import numpy as np
import matplotlib.pyplot as plt

num     = 1001
std     = 5

# x  : x-coordinate data
# y1 : (noisy) y-coordinate data
# y2 : (clean) y-coordinate data

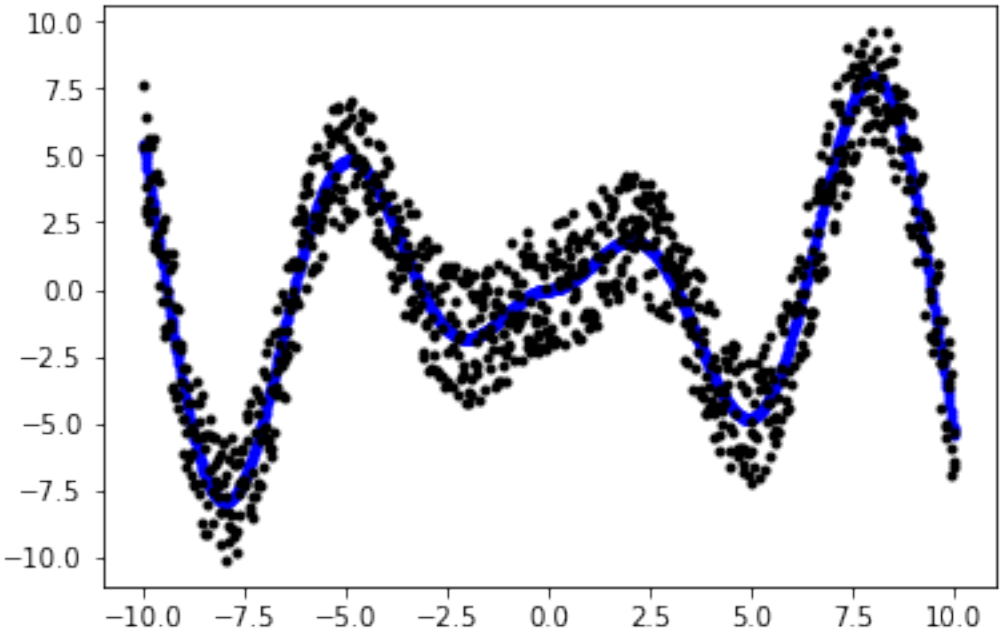
def fun(x):

        # f = np.sin(x) * (1 / (1 + np.exp(-x)))
        f = np.abs(x) * np.sin(x)

        return f

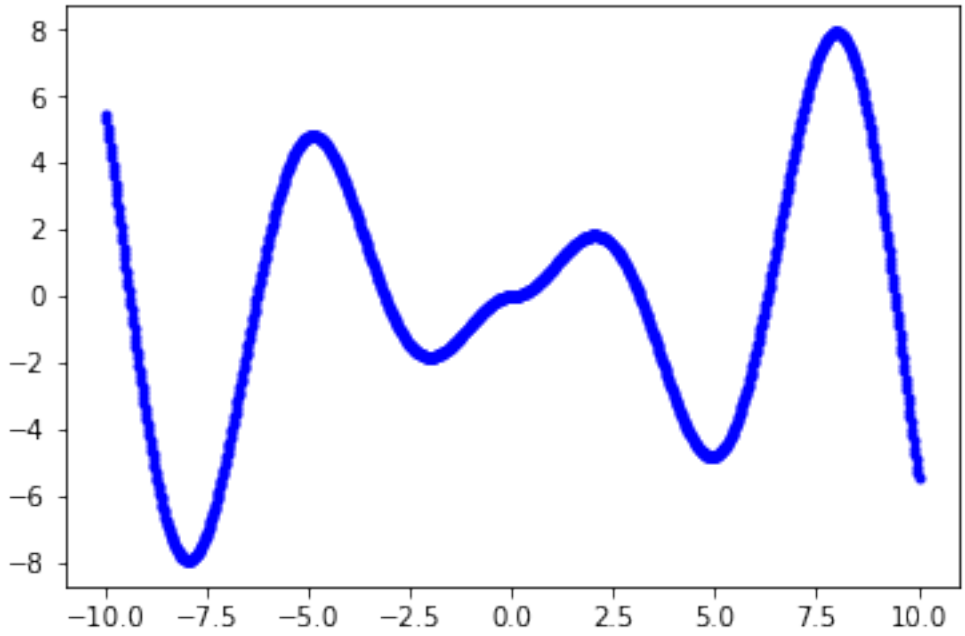
n       = np.random.rand(num)
nn      = n - np.mean(n)
x       = np.linspace(-10,10,num)
y1      = fun(x)
y2      = y1 + nn * std

plt.plot(x, y1, 'b.', x, y2, 'k.')
plt.show()
```



Plot the clean data (x, y1)

```
In [6]: ### Plot the clean data (x, y1) ###
        plt.plot(x, y1, 'b.')
        plt.show()
```



Plot the noise data (x, y2)

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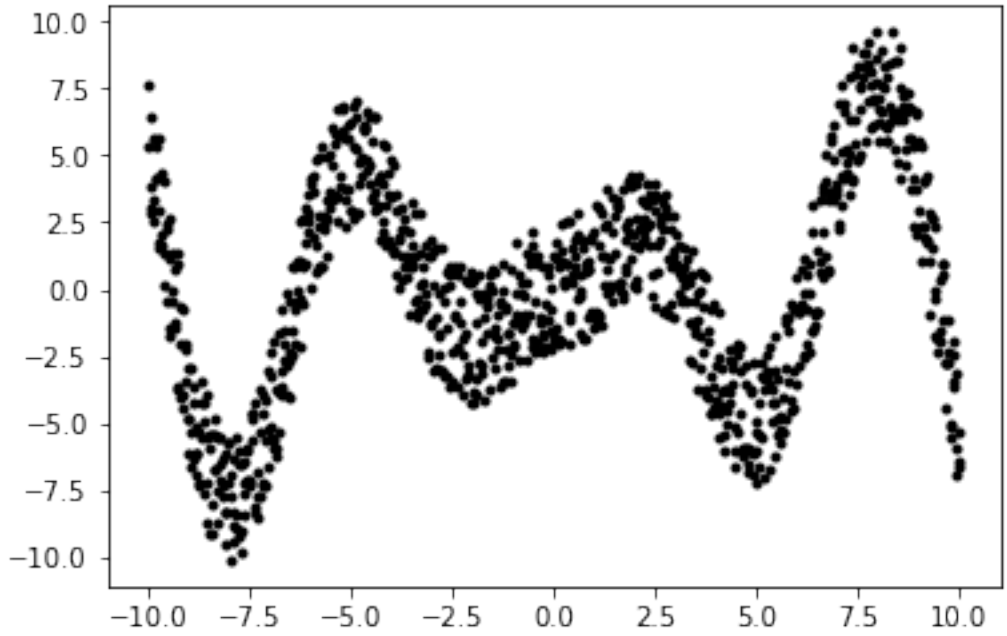
In [5]: ### Plot the noisy data (x, y2)  ###
        plt.plot(x, y2, 'k.')
        plt.show()
```



Plot the polynomial curves that fit the noisy data by the least square error with varying p = 0, 1, 2, 3, · · · 9

```
In [85]: ###  Plot the polynomial curves that fit the noisy data with numpy.polynomial.polynomia

         import numpy.polynomial.polynomial as poly

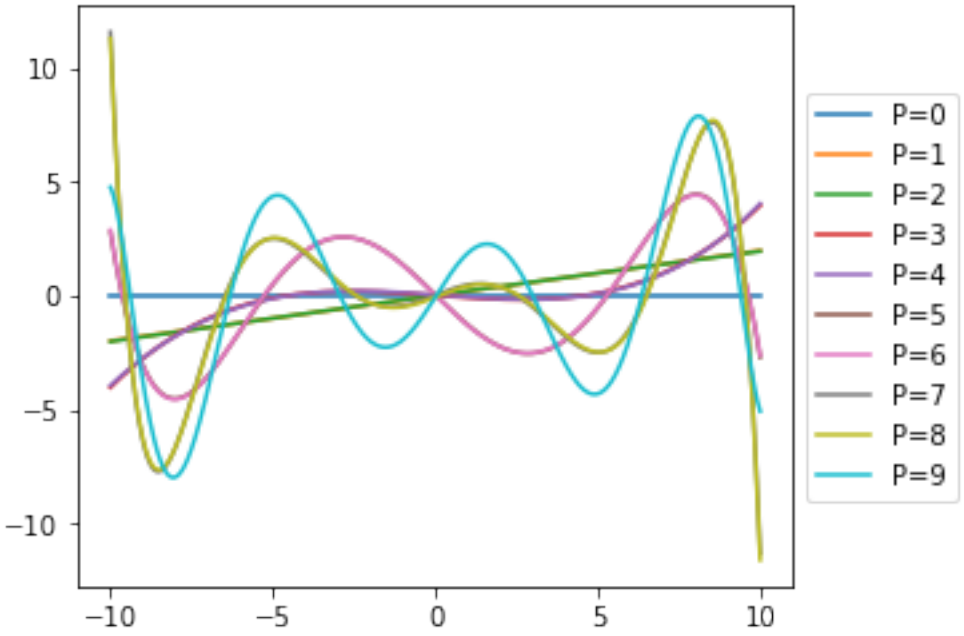
         label = [0,1,2,3,4,5,6,7,8,9]

         fig = plt.figure()
         ax = plt.subplot(111)

         for i in range(0,10):
             c = poly.polyfit(x, y2, i)
             f = poly.polyval(x, c)

             ax.plot(x, f, label="P="+str(i))

         box = ax.get_position()
         ax.set_position([box.x0, box.y0, box.width * 0.8, box.height])
         ax.legend(loc='center left', bbox_to_anchor=(1, 0.5))
         plt.show()
```



Plot the error the residual with varying p = 0, 1, 2, 3, · · · 9

In [ ]: