assignment06

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1 Assignment05 : Straight line fit

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4 GitHub Link : https://github.com/joo228/assignment.git

5 import package for plotting, data management and dealing image

```
In [22]: import numpy as np
         import matplotlib.pyplot as plt
```

6 define data and make some noise

6.1 x : x-coordinate data

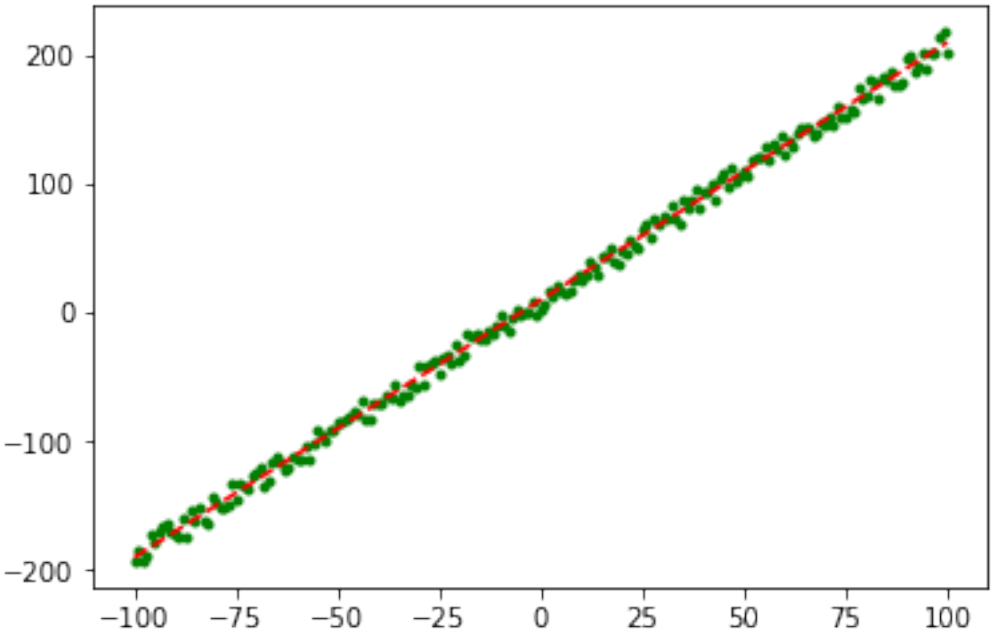
6.2 y1 : (noisy) y-coordinate data

6.3 y2 : (clean) y-coordinate data

```
In [4]: num     = 201
        std     = 20
        a       = 2
        b       = 10

        n       = np.random.rand(num)
        nn      = n - np.mean(n)
        x       = np.linspace(-100,100,num)
        y1      = a * x + nn * std + b
        y2      = a * x + b

        plt.plot(x, y1, 'g.', x, y2, 'r--')
        plt.show()
```



7 find a line that fits the given data

7.0.1 approximating line is obtained by the least square

7.0.2 $y = f(x) = \theta 1 * x + \theta 2$

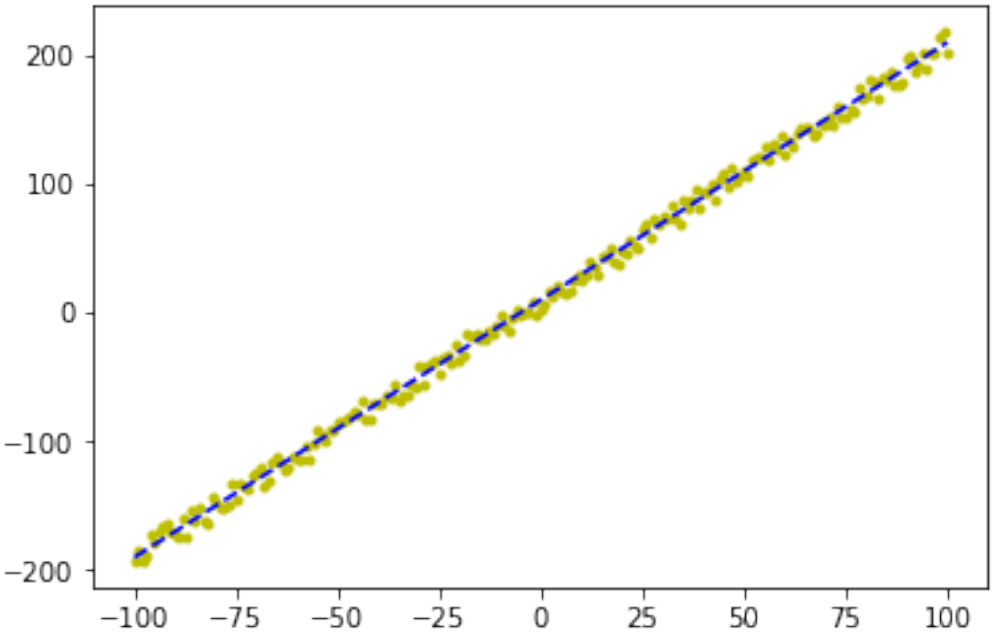
7.0.3 $\theta = (A^T A)^{-1} A^T y2$

In [29]:
```
A=[np.ones(num)]
A.append(x)
A= np.array(A)
pinv_A=np.linalg.pinv(A)
theta=np.matmul(pinv_A.transpose(), y2)
print(theta)
```

```
[ 10.   2.]
```

8 plot approximated line with data

In [33]:
```
y3=np.matmul(A.transpose(), theta)
plt.plot(x, y1, 'y.', x, y3, 'b--')
plt.show()
```


200
100
0
−100
−200
−100
−75
−50
−25
0
25
50
75
100