

[1]

1.

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

comb=sp.comb
n=10
x=np.arange(0,n+1)
c=comb(n,x)

In [5]: def binom(x,n,p):
        prob= comb(n,x) * p**x * (1-p)**(n-x)
        return prob

b= binom(x, n=10, p=0.1)
x, b

Out[5]: (array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10]),
        array([0.34867844, 0.38742049, 0.19371024, 0.05739563, 0.01116026,
               0.00148803, 0.00013778, 0.00000875, 0.00000036, 0.00000001,
               0.          ]))
```

2. $10 \cdot 0.1 = 1$

3. $(10 \cdot 0.1 \cdot 0.9)^{1/2} = 0.9487$

4.

$$\sum_{x=0}^{10} \binom{10}{x} \left(0.1\right)^x \left(0.9\right)^{10-x}$$

[2]

1. $f_W(w) = P(W=w) = \frac{e^{-100} (100^w)}{w!}$
2. $E(W) = 100$ $\text{std}[W] = 10$
 $E(W) + \text{std}[W] = 110$
3. $P(|W - E[W]| \leq 2 \cdot \text{std}[W]) = P(|W - 100| \leq 20) = P(80 \leq W \leq 120)$
4. $P(W > 120)$
5. 拒絕，因為偏差值過高

[3]

1.

In [6]: 1- st.binom.cdf(k=10, n=100, p=0.05)

Out[6]: 0.011472410067484784

2.

(7) $P(X \geq 10 | p = 5\%) = P(X \geq 10)$
 $p = 5\% \Rightarrow X \geq 10$
但“ $X \geq 10$ ”确实算出
b) $p \rightarrow q \sim q \rightarrow \sim q$
 $\uparrow \rightarrow \sim q \cdot q \rightarrow \sim p$

[4]

[4] $b(x; n, p) = \binom{n}{x} \cdot p^x \cdot q^{n-x}$
 $p(x=k) = \frac{n!}{k!} \cdot e^{-\mu}$
 $\left. \begin{array}{l} n \rightarrow \infty \\ p \rightarrow 0 \\ np = \mu \end{array} \right\}$