2016302580320-任思远-第六次作业

4.9

$$\begin{aligned}\hat{p}_N(x) &= \frac{1}{N}\sum_{i=1}^{N}\delta(x-x_i)\\ &= \frac{1}{\sqrt{2\pi}\cdot N\cdot V_N}\sum_{i=1}^{N}e^{-\frac{(x-x_i)^2}{2h_N^2}}\end{aligned}$$

取 $N=6, R_6=[0,6.4], V_N=6.4, h_N=1$，得

$\hat{p}_6(x)=\frac{1}{\sqrt{2\pi}\cdot 6\cdot 6.4}\sum_{i=1}^{6}e^{-\frac{(x-x_i)^2}{2}}$

```python
import numpy as np
import matplotlib.pyplot as plt
from scipy.stats import norm

xi = [3.2, 3.6, 3, 6, 2.5, 1.1]
h = np.arange(1, 4, 0.5)
VN = 6.4


def p6(x: float, hN: float) -> float:
    return sum(map(norm.pdf, map(lambda _xi: (x - _xi) / hN, xi))) / len(xi) / VN


```

```
x = np.arange(0, 6, 0.1)

for hN in h:
    p6_hN = lambda x: p6(x, hN)
    y = list(map(p6_hN, x))
    plt.plot(x, y)

plt.legend(list(map(lambda hN: "hN = " + str(hN), h)), loc='upper left')
plt.xlabel("x")
plt.ylabel("probability")

plt.show()
```