请验证以下表格

$$SGN(x)=\begin{cases}1, x>0\\-1, x=0\\-1, x<0\end{cases}$$

表： 感知机训练过程

迭代次数	x	y	$\hat{y}$	w
0	(3.7, –10.5, 27.49)	+1	-1	(0, 0, 0)
1	(4.8, 0.13, 21.75)	–1	+1	(3.7, –10.5, 27.49)
2	(4.9, 1.25, 22.31)	–1	+1	(–1.1, –10.63, 5.74)
3	(4.8, 0.13, 21.75)	–1	–1	(–6., –11.88, –16.57)
4	(3.7, –10.5, 27.49)	+1	–1	(–6., –11.88, –16.57)
5	(4.9, 1.25, 22.31)	–1	+1	(–2.3, –22.38, 10.92)
6	(3.7, –10.5, 27.49)	+1	–1	(–7.2, –23.63, –11.39)
7	(4.9, 1.25, 22.31)	–1	+1	(–3.5, –34.13, 16.1)
8	(4.8, 0.13, 21.75)	–1	–1	(–8.4, –35.38, –6.21)
9	(3.7, –10.5, 27.49)	+1	+1	(–8.4, –35.38, –6.21)
10	(4.9, 1.25, 22.31)	–1	–1	(–8.4, –35.38, –6.21)
11	(4.8, 0.13, 21.75)	–1	–1	(–8.4, –35.38, –6.21)

通过代码验证如下

```
import numpy as np
```
[1] ✓ 0.0s Python

```
n = 3

data_x = [
    [3.7, -10.5, 27.49],
    [4.8, 0.13, 21.75],
    [4.9, 1.25, 22.31],
    [4.8, 0.13, 21.75],
    [3.7, -10.5, 27.49],
    [4.9, 1.25, 22.31],
    [3.7, -10.5, 27.49],
    [4.9, 1.25, 22.31],
    [4.8, 0.13, 21.75],
    [3.7, -10.5, 27.49],
    [4.9, 1.25, 22.31],
    [4.8, 0.13, 21.75]]
data_y = [1, -1, -1, -1, 1, -1, 1, -1, -1, 1, -1, -1]

data_x = np.array(data_x)
data_y = np.array(data_y)
```
[2] ✓ 0.0s

```
def SGN(x):
    if x > 0:
        return 1
    else:
        return -1
```
[3] ✓ 0.0s

```
w = [0, 0, 0]
w = np.array(w)
result = []

for k in range(12):
    # print("k:", k)
    x = data_x[k]
    y = data_y[k]
    wx = np.dot(w, x)
    # print("w^T * x:", wx)
    y_est = SGN(wx)
    # print("y_estimate:", y_est)
    if y_est * y <= 0:
        w = np.add(w, y*x)
    # print("w:", w)
    # print()

    result.append((k, wx, y_est, w))

for (k, wx, y_est, w) in result:
    print(f"k: {k}, w^T * x: {wx}, y_estimate: {y_est}, w: {w}")
```
✓ 0.0s Pythor

```
k:  0, w^T * x:    0.00, y_estimate: -1, w: [  3.7  -10.5   27.49]
k:  1, w^T * x:  614.30, y_estimate:  1, w: [ -1.1  -10.63   5.74]
k:  2, w^T * x:  109.38, y_estimate:  1, w: [ -6.   -11.88 -16.57]
k:  3, w^T * x: -390.74, y_estimate: -1, w: [ -6.   -11.88 -16.57]
k:  4, w^T * x: -352.97, y_estimate: -1, w: [ -2.3  -22.38  10.92]
k:  5, w^T * x:  204.38, y_estimate:  1, w: [ -7.2  -23.63 -11.39]
k:  6, w^T * x:  -91.64, y_estimate: -1, w: [ -3.5  -34.13  16.1 ]
k:  7, w^T * x:  299.38, y_estimate:  1, w: [ -8.4  -35.38  -6.21]
k:  8, w^T * x: -179.99, y_estimate: -1, w: [ -8.4  -35.38  -6.21]
k:  9, w^T * x:  169.70, y_estimate:  1, w: [ -8.4  -35.38  -6.21]
k: 10, w^T * x: -223.93, y_estimate: -1, w: [ -8.4  -35.38  -6.21]
k: 11, w^T * x: -179.99, y_estimate: -1, w: [ -8.4  -35.38  -6.21]
```