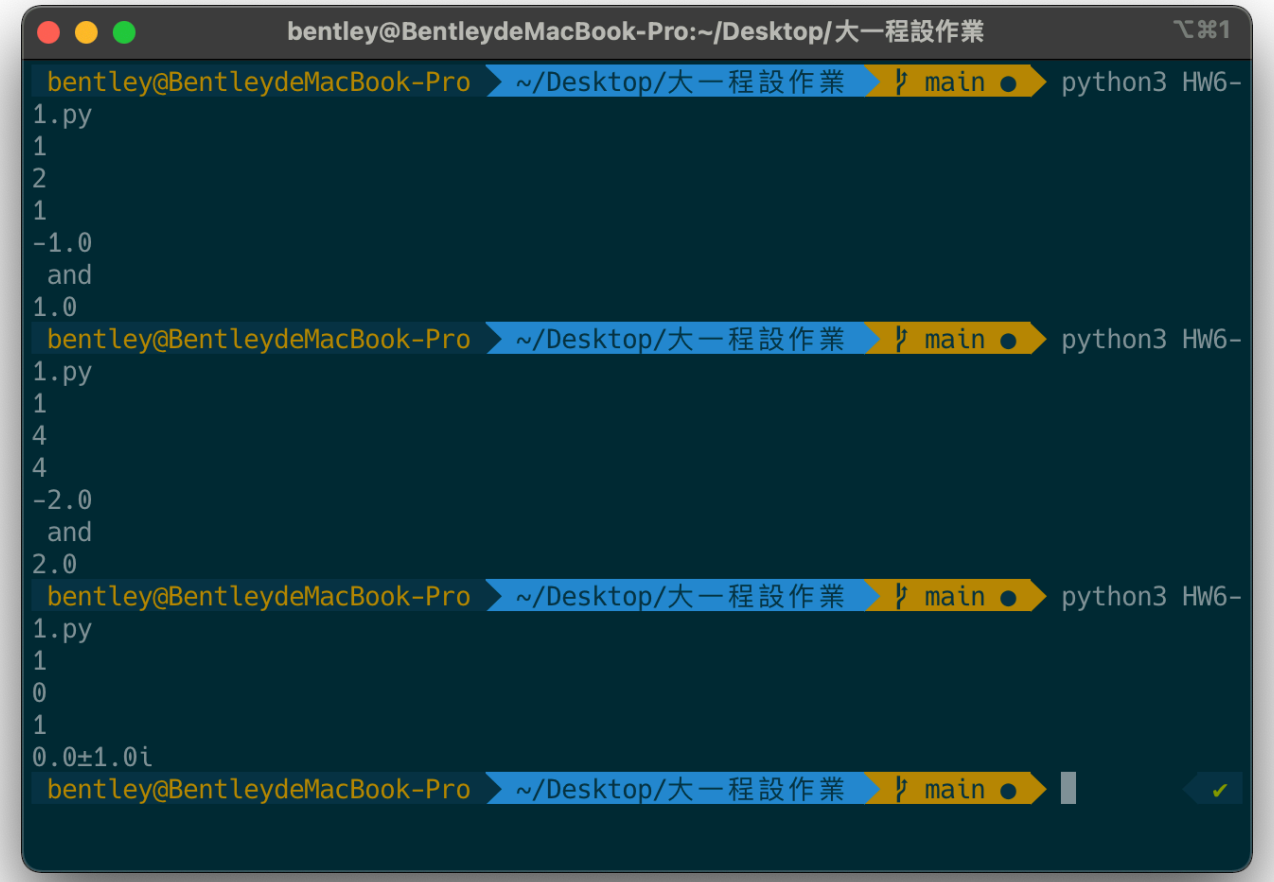
110011235_黃亮軒_HW6

第一題：

程式碼：

```
from numpy import sqrt
a,b,c=int(input()),int(input()),int(input())
if (b*b-4*a*c)<0:
    print((-b/2*a),end="")
    print("±",end="")
    print((sqrt(-(b*b-4*a*c)))/2*a,end="")
    print("i")
else:
    print((-b+sqrt(b*b-4*a*c))/2*a)
    print(" and ")
    print(-(-b-sqrt(b*b-4*a*c))/2*a)
```

結果：

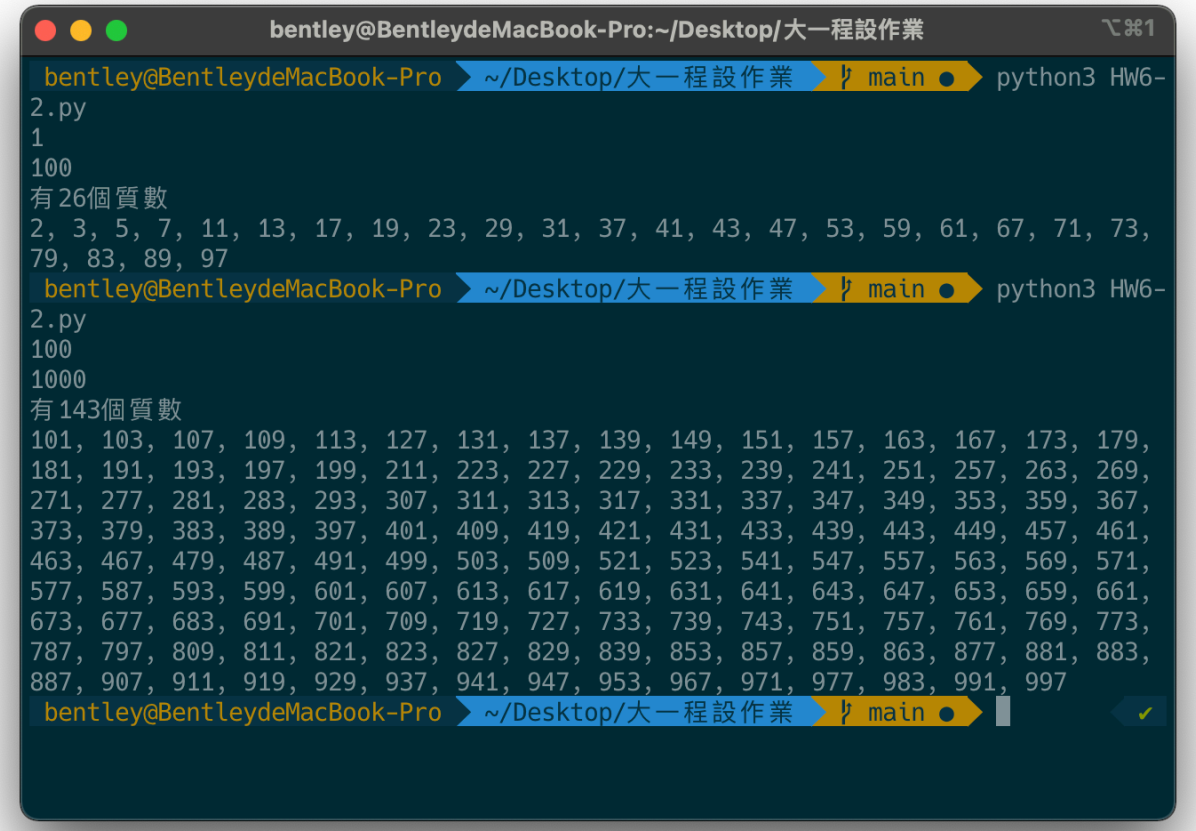


第二題：

程式碼：

```
a,b=int(input()),int(input())
bol=1
counter=0
s=""
for i in range(a,b):
    bol=1
    if i==1:continue
    if i==2:
        counter+=1
    for j in range(2,i-1):
        if i%j==0:
            bol=0
            break
    if bol==1:
        counter+=1
        s+=str(i)+", "
s = s[:-2]
print("有"+str(counter)+"個質數\n"+s)
```

結果：

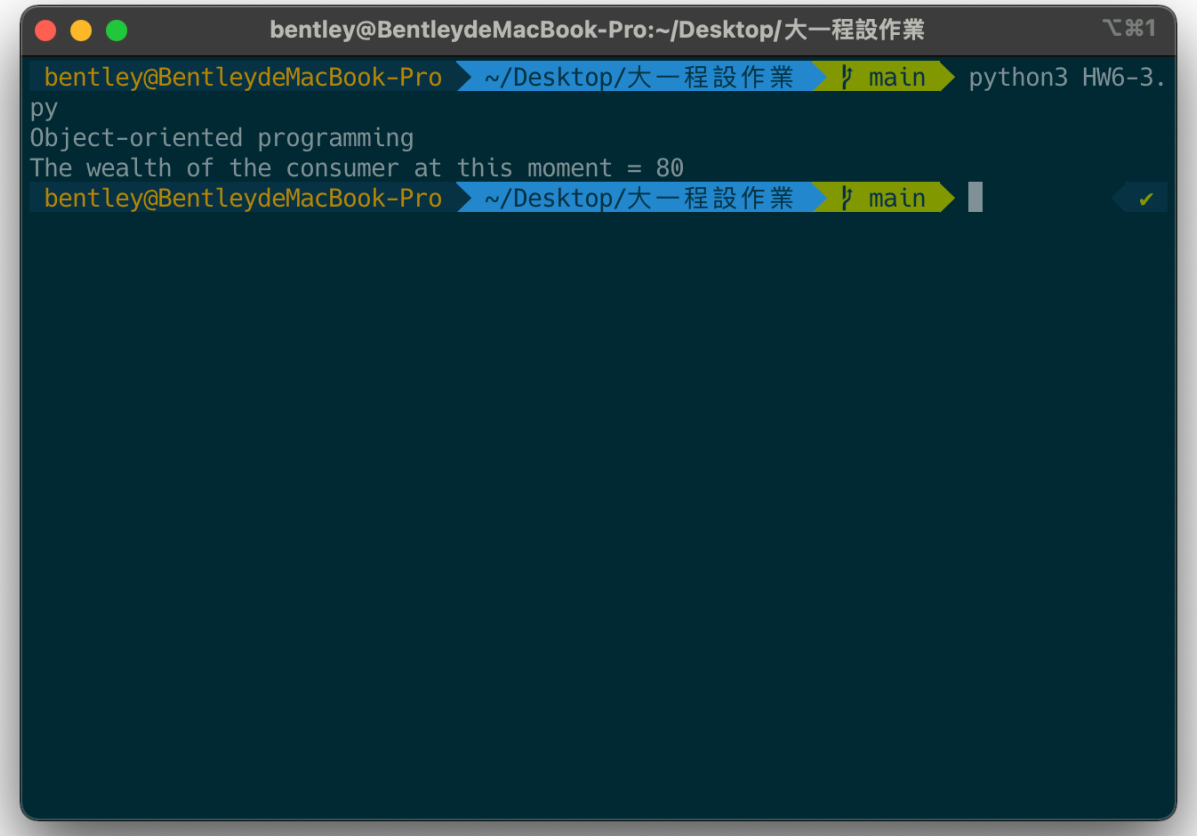


第三題：

程式碼：

```
class Consumer:
    def __init__(self, w):
        self.wealth = w
    def earn(self, y):
        self.wealth = self.wealth + y
    def spend(self, x):
        new_wealth=self.wealth-x
        if new_wealth < 0:
            print("Insufficient funds")
        else:
            self.wealth = new_wealth
c1 = Consumer(100)
c1.earn(10)
c1.spend(20)
c1.earn(10)
c1.spend(20)
print("Object-oriented programming")
print("The wealth of the consumer at this moment
=“,c1.wealth)
```

結果：

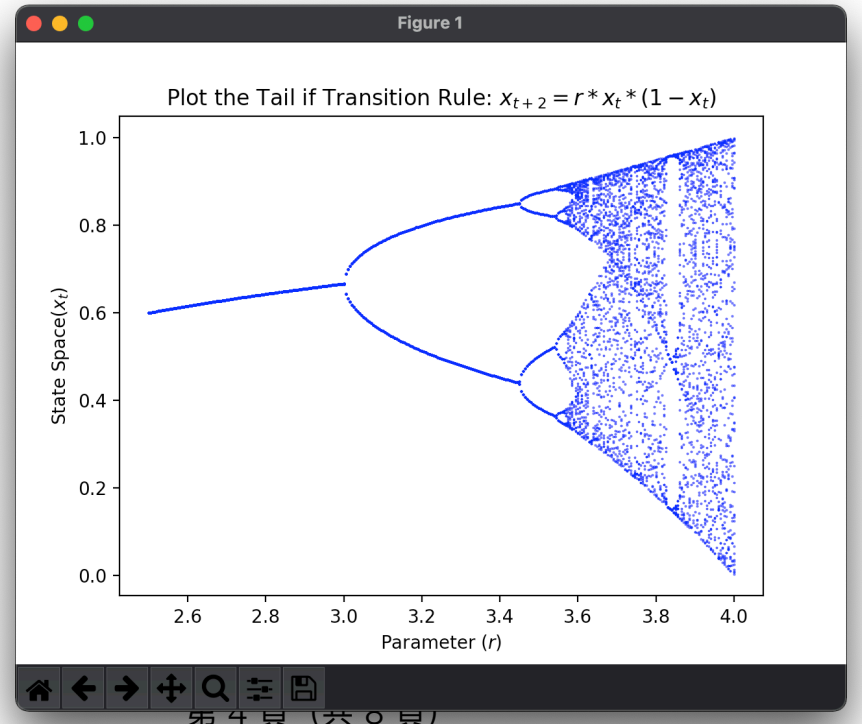


第四題：

程式碼：

```
import matplotlib.pyplot as plt
class Chaos:
    def __init__(self, x0, r):
        self.x, self.r=x0,r
    def update(self):
        self.x = self.r * self.x *(1-self.x)
    def generate_sequence(self, n):
        path = []
        for i in range(n):
            path.append(self.x)
            self.update()
        return path
fig, ax = plt.subplots()
x0=0.1
r=2.5
chaos = Chaos(x0,r)
while r<4:
    chaos.r=r
    t = chaos.generate_sequence(1000)[950:]
    ax.plot([r]*len(t), t, 'b.', ms=0.6)
    r=r+0.005
ax.set_title('Plot the Tail if Transition Rule: $x_{t+2}
=r*x_t*(1-x_t)$')
ax.set_xlabel('Parameter ($r$)')
ax.set_ylabel('State Space($x_t$)')
plt.show()
```

結果：



第五題：

程式碼：

```
import numpy as np
import matplotlib.pyplot as plt
from matplotlib.pyplot import *
figure(figsize=(6, 6), dpi=80)
def f(x):
    return np.sqrt(1-x**2)
N = 5000
x = np.arange(0, 1, 0.0001)
y = f(x)
x_rand = np.random.random(N)
y_rand = np.random.random(N)

ind_below = np.where(y_rand < f(x_rand))
ind_above = np.where(y_rand >= f(x_rand))
bel = np.count_nonzero(y_rand < f(x_rand))
abo = np.count_nonzero(y_rand >= f(x_rand))
pts_below = plt.scatter(x_rand[ind_below],
y_rand[ind_below], color = "red", s=10)
pts_above = plt.scatter(x_rand[ind_above],
y_rand[ind_above], color = "green", s=10)
plt.plot(x, y, color = "blue")
print("The result is : ",end="")
print(4*(bel)/N)
plt.legend((pts_below, pts_above),('Pts below the
curve', 'Pts above the curve’),loc='lower
left',ncol=3,fontsize=8)
plt.show()
```

結果：

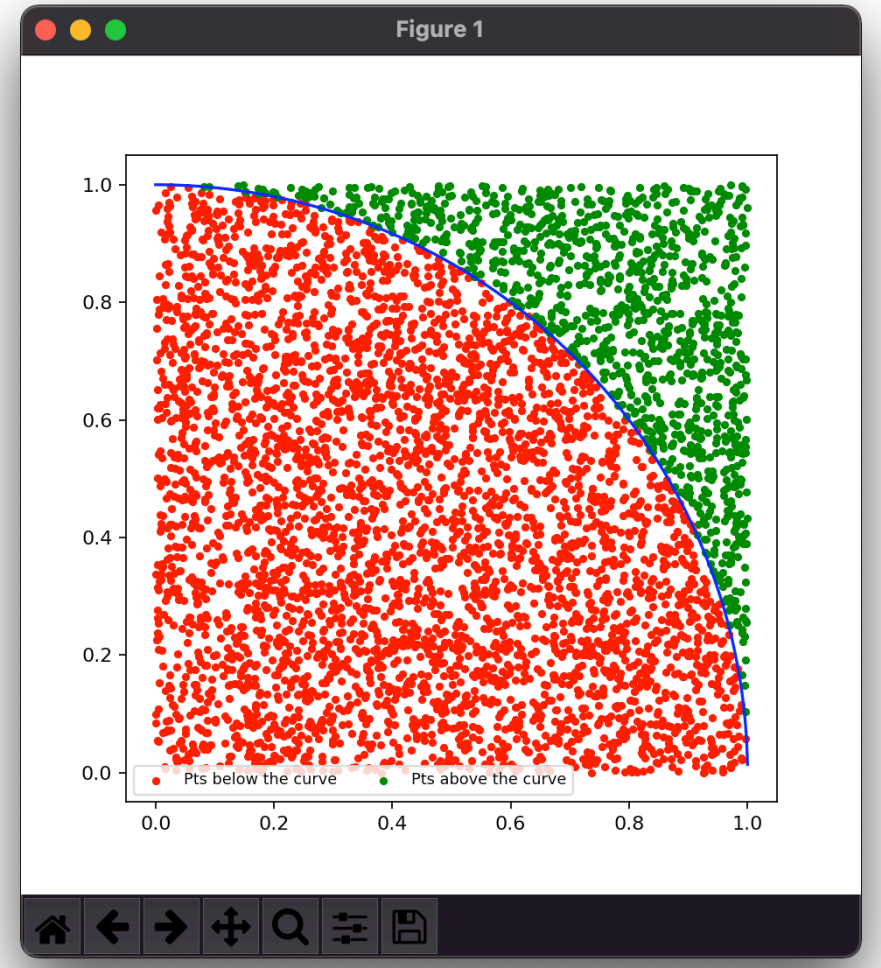


Figure 1
1.0
0.8
0.6
0.4
0.2
0.0
0.0
0.2
0.4
0.6
0.8
1.0
Pts below the curve
Pts above the curve

第六題在下一頁

第六題：

程式碼：

```
import numpy as np
import random
from random import randrange
import matplotlib.pyplot as plt
from matplotlib.pyplot import *
figure(figsize=(8, 6), dpi=80)
def f(x):
    return
np.abs((np.sin((2*np.pi*x)))**5-2*(np.cos(3*(np.co
s((x/np.pi))**2))**3))
N = 10000
x0 = 0
x1 = 10
x = np.arange(0, 10, 0.001)
y = f(x)
fmax = max(y)
x_rand = x0 + (x1 - x0)*np.random.random(N)
y_rand = np.random.random(N)*fmax
ind_below = np.where(y_rand < f(x_rand))
ind_above = np.where(y_rand >= f(x_rand))
bel = np.count_nonzero(y_rand < f(x_rand))
abo = np.count_nonzero(y_rand >= f(x_rand))
pts_below = plt.scatter(x_rand[ind_below],
y_rand[ind_below], color = "red", s=8)
pts_above = plt.scatter(x_rand[ind_above],
y_rand[ind_above], color = "green", s=8)
plt.plot(x, y, color = "blue")
print("N="+str(N)+"\nThe integral of the ugly
function over [0,10] is : ",end="")
print(round(10*fmax*(bel/(bel+abo)),3))
plt.legend((pts_below, pts_above),('Pts below the
curve', 'Pts above the curve'),loc='lower
left',ncol=3,fontsize=8)
plt.show()
```

結果：


python3 /Users/bentley/Desktop/大一程設作業/HW6-6.py
⌥⌘1
bentley@BentleydeMacBook-Pro ~ python3 /Users/bentley/Desktop/大一程設作業/HW6-6.py
N=10000
The integral of the ugly function over [0,10] is : 12.236

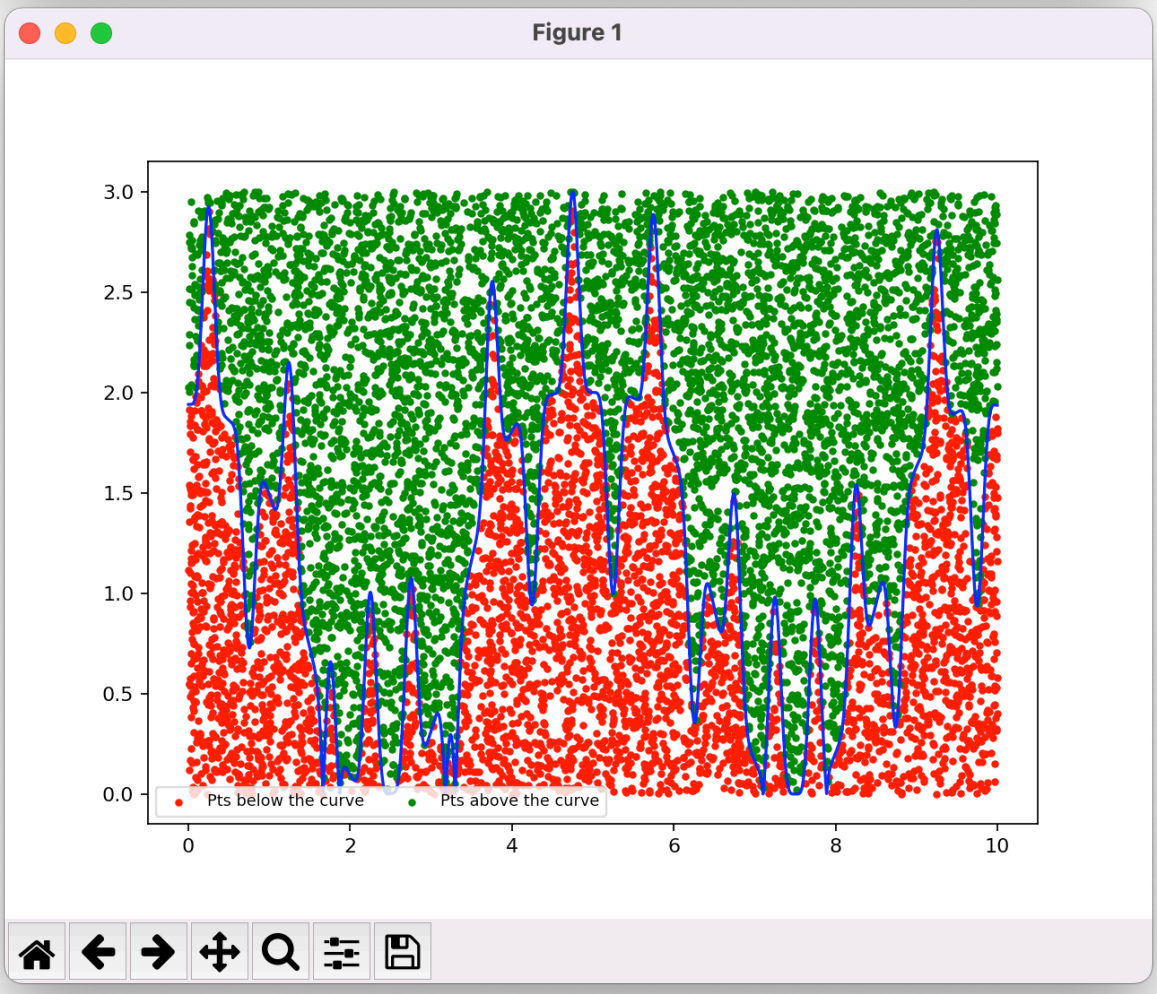


Figure 1
3.0
2.5
2.0
1.5
1.0
0.5
0.0
0
2
4
6
8
10
Pts below the curve
Pts above the curve