Question 1:

1. This code is saved in Question1.py
2. This program allows the user to input the final account value, interest rate (the unit is %) and the number of years. The output would be the initial value of money that has to be saved to obtain the final account.
3. The final account value and interest rate should be **positive real numbers** and the number of years should be **positive integer**.
   If the user input alphas instead of digits, the user will receive a reminder, saying 'invalid input'.
4. Execute as followings
   1. When input is alpha (improper situation):

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surfa
ce/appdata/local/programs/python/python38/python.ex
e c:/Users/surface/Desktop/csc1001作业/Question1.py

Enter the final account value: This is alpha
invalid input
```

   2. When input satisfies the conditions:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/pyt
hon38/python.exe c:/Users/surface/Desktop/csc1001作业/Question1.py
Enter the final account value: 5000
Enter the annual interest rate:4.25
Enter the number of years: 3
The initial value is  4413.080132309107
```

Question 2:

1. This code is saved in Question2.py
2. This program allows the user to enter a positive integer.

   The output would be each of the digits of the integer one by one. (one digit per line)
3. The user must input a positive integer.

   If he\she does so:

   1): input a string containing alphas: it will return ‘invalid input’

   2): input a negative number or a real positive number which is not a integer: it will return ‘your input is not a positive integer’.

4. Execute as followings:

   1. When input a string containing alphas (improper):

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appda
ta/local/programs/python/python38/python.exe c:/Users/surfa
ce/Desktop/csc1001作业/Question2.py
Enter an positive integer: this is alpha
invalid input
```

   2. When input a negative number or not an integer (improper)

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appda
ta/local/programs/python/python38/python.exe c:/Users/surfa
ce/Desktop/csc1001作业/Question2.py
Enter an positive integer: -3
your input is not a positive integer
```

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appda
ta/local/programs/python/python38/python.exe c:/Users/surfa
ce/Desktop/csc1001作业/Question2.py
Enter an positive integer: 3.14
your input is not a positive integer
```

3. When input satisfies the conditions:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdat
a/local/programs/python/python38/python.exe c:/Users/surface
/Desktop/csc1001作业/Question2.py
Enter an positive integer: 3125
3
1
2
5
```

Question 3:

1. This code is saved in Question3.py

2. The program allows the user to input a real number m (it can be negative or a float). The task is to return the smallest integer whose square is larger than m.

3. This number must be a real number (negative and float numbers are accepted)

If inputting a string containing alphas, it will return ‘invalid input’

4. Execute as followings:

1. When inputting a string containing alphas (improper):

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/loca
l/programs/python/python38/python.exe c:/Users/surface/Desktop/csc
1001作业/Question3.py
Enter a number: there are alphas
invalid input
```

2. When inputting a positive number satisfies the conditions:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc1001作业/Question3.py
Enter a number: 10
4
```

3. When inputting a negative number satisfies the conditions:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc1001作业/Question3.py
Enter a number: -7
Any interger's square is larger than -7
```

4. When inputting a float number:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc1001作业/Question3.py
Enter a number: 3.75
2
```

Question 4:

1. This code is saved in Question4.py

2. This program allows the user to input a positive integer. The output will be a table showing every positive integer m that is smaller or equal to the number and the values of m+1

3. This number must be a positive integer.

If the user fails to input it:

1. if the user input a string containing alphas: it will return ‘Not a number’

2. if the user input a float or a negative number, it will return ‘

'invalid input! enter again''

Both of the two situations will make the user to input again!!

4. Execute as followings:

1. improper situation:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc1001作业/Question4.py
Please enter an interger: alphas
Not a digit
Please enter an interger: 3.14
invalid input! enter again
Please enter an interger: -7
invalid input! enter again
Please enter an interger:
```

2. proper situation:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc1001作业/Question4.py
Please enter an interger: 6
m       m+1     m**(m+1)
1       2       1
2       3       8
3       4       81
4       5       1024
5       6       15625
6       7       279936
```

Question 5:

1. This code is saved in Question5.py

2. This program allows a user to input an integer N and print all the prime numbers that are smaller than N. If there are more than 8 prime numbers, it will adjust its format, making each line at most 8 numbers.

3. The number must be a positive integer larger than 2.

If the user does so (improper):

1.): input a string containing alphas: it will return ‘your input is not digit’

2): input a number less than 2: it will return ‘your input is not integer lager than 2’

3); input a number is not integer: it will return “your input is not an integer”

All the situations above will require the user to input again until they make it right.

4. Execute as followings:

1. improper situations:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc1001作业/Question5.py
Enter a integer >=2: 3.14
your input is not an integer

C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc1001作业/Question5.py
Enter a integer >=2: -1
your input is not integer lager than 1

C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc1001作业/Question5.py
Enter a integer >=2: r321f
your input is not digit
```

2.proper situations:

1): less than 8 prime numbers:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc1001作业/Question5.py
Enter a integer >=2: 7
The prime numbers smaller than 7 include:
2       3       5
```

2): More than 8 prime numbers:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc1001作业/Question5.py
Enter a integer >=2: 366
The prime numbers smaller than 366 include:
2       3       5       7       11      13      17      19
23      29      31      37      41      43      47      53
59      61      67      71      73      79      83      89
97      101     103     107     109     113     127     131
137     139     149     151     157     163     167     173
179     181     191     193     197     199     211     223
227     229     233     239     241     251     257     263
269     271     277     281     283     293     307     311
313     317     331     337     347     349     353     359
```

Question 6:

1. This code is saved in Question6.py

2. This program allows the user to choose one of the trigonometric functions (sin/cos/tan), and input the interval endpoints a, b and number of sub-intervals n. By approximation, we can get the near value of the definite integral of trigonometric function

3. the function must be sin/cos/tan, and a,b must be real numbers and n must be a positive integral.

If the user does the following improper things:

1): input a function which is not sin/cos/tan: it will return “invalid input”

2); input n by string with alphas: it will return ‘your input in n is invalid’; input a,b with alphas: ‘a,b must be digit’

3): input n with a negative number or a float number: it will return:

‘'n is not an positive integer''

All the situations above will require the user to input again until the user make it right

4. Execute as followings:

1): improper situations:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc100
1作业/Question6.py
please enter a funtion name (sin,cos,tan): this is function
invalid input
please enter a funtion name (sin,cos,tan): sin
please enter a number for n: hahahha
your input in n is invalid
please enter a number for n: 3.14
n is not an positive integer
please enter a number for n: -7
n is not an positive integer
please enter a number for n: 10000
please enter a number for a: alpha
a,b must be digit
please enter a number for a: 3
please enter a number for b: alpha
a,b must be digit
please enter a number for a: 3
please enter a number for b: 9
Result is: -0.07886223589869265
```

2): proper situations:

```
C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc100
1作业/Question6.py
please enter a funtion name (sin,cos,tan): sin
please enter a number for n: 100000
please enter a number for a: 3
please enter a number for b: 9
Result is: -0.0788622347276065

C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc100
1作业/Question6.py
please enter a funtion name (sin,cos,tan): cos
please enter a number for n: 100000
please enter a number for a: 3
please enter a number for b: 9
Result is: 0.2709984722256243

C:\Users\surface\Desktop\csc1001作业>c:/users/surface/appdata/local/programs/python/python38/python.exe c:/Users/surface/Desktop/csc100
1作业/Question6.py
please enter a funtion name (sin,cos,tan): tan
please enter a number for n: 1000000
please enter a number for a: 3
please enter a number for b: 9
Result is: -1.0784494651263519
```