

Title	Assignment 5
Due	30-Mar-2012 17:00
Number of resubmissions allowed	0
Grade	90.0 (max 100.0)
Modified by instructor	22-Mar-2012 12:03

Instructions

This tutorial is about flow of control mechanisms in Python, such as *if*, *for* and *while*.

Question 1

Write a program to simplify a fraction if possible. To do this, you must first calculate the greatest common divisor (GCD) of the numerator and denominator. Then divide each number by this GCD.

Use Euclid's algorithm to calculate the GCD.

$\text{gcd}(a, 0) = a$

$\text{gcd}(a, b) = \text{gcd}(b, a \bmod b)$

Use a loop to continuously apply the second step ($a=b$ and $b=a \bmod b$) until $b==0$.

Sample I/O:

```
Enter the numerator:
6
Enter the denominator:
15
Simplified fraction: 2/5
```

Save your program as **question1.py**.

Question 2

[Reference : <http://www.youtube.com/watch?v=ESaTREAAzww>]

In many user interfaces a user is presented with a set of options, one of which is selected to perform a particular task. Text-based programs often print out these options linearly and allow users to select options continuously until a specific task has been chosen.

In the precursor to the Internet, public Bulletin Board Systems (BBS) were used to exchange information (messages/files) in a community of users. Write a program to simulate a simple BBS with one stored message and 2 fixed files, as indicated in the output. Study the output carefully before you start programming!

Use a default message of "no message yet"; and if a file cannot be located, output "File not found".

Sample I/O:

```
Welcome to UCT BBS
MENU
(E)nter a message
(V)iew message
(L)ist files
(D)isplay file
e(X)it
Enter your selection:
E
Enter the message:
test message
Welcome to UCT BBS
MENU
(E)nter a message
(V)iew message
(L)ist files
(D)isplay file
e(X)it
Enter your selection:
V
The message is: test message
Welcome to UCT BBS
MENU
(E)nter a message
(V)iew message
(L)ist files
(D)isplay file
e(X)it
Enter your selection:
X
Goodbye!
```

Sample I/O:

```
Welcome to UCT BBS
MENU
(E)nter a message
(V)iew message
(L)ist files
(D)isplay file
e(X)it
Enter your selection:
l
List of files: 42.txt, 1015.txt
Welcome to UCT BBS
MENU
(E)nter a message
(V)iew message
(L)ist files
(D)isplay file
e(X)it
Enter your selection:
d
Enter the filename:
42.txt
```

```
The meaning of life is blah blah blah ...
Welcome to UCT BBS
MENU
(E)nter a message
(V)iew message
(L)ist files
(D)isplay file
e(X)it
Enter your selection:
d
Enter the filename:
1015.txt
Computer Science class notes ... simplified
Do all work
Pass course
Be happy
Welcome to UCT BBS
MENU
(E)nter a message
(V)iew message
(L)ist files
(D)isplay file
e(X)it
Enter your selection:
d
Enter the filename:
1016.txt
File not found
Welcome to UCT BBS
MENU
(E)nter a message
(V)iew message
(L)ist files
(D)isplay file
e(X)it
Enter your selection:
x
Goodbye!
```

Save your program as **question2.py**.

Question 3

Write a program to simulate a vending machine and calculate change based on the amount paid. Given the cost, the user should first be prompted to add more money until the cost is met/exceeded by the payment.

Assume that all change is given in coins only and coins come in the following denominations: R5, R2, R1, 50c, 20c, 10c, 5c

Sample I/O:

```
Enter the cost (in cents):
750
Deposit a coin or note (in cents):
500
Deposit a coin or note (in cents):
500
```

Your change is:

1 x R2

1 x 50c

Save your program as **question3.py**.

Question 4

[Reference : <http://www.youtube.com/watch?v=mK-BZs1uVZM>]

Write a program to draw a text-based graph of a mathematical function $f(x)$.

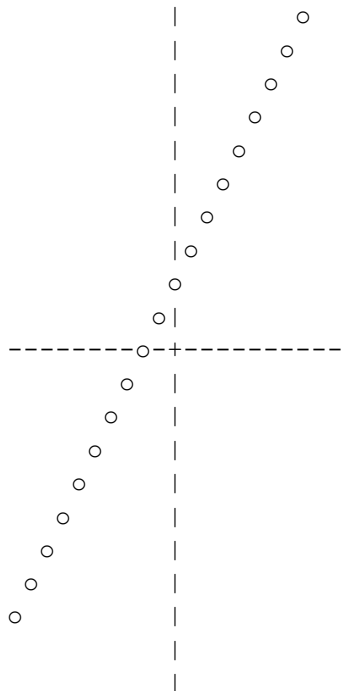
Use axis limits of -10 to 10, with only discrete points plotted. Use nested loops to scan through the entire area of the graph and wherever the (rounded) value of $f(x)$ is equal to the y, output "o" (small letter Oh). Otherwise, output either the appropriate axis character or a space. Remember to import math to use some mathematical functions.

To support entering of arbitrary functions, the user must enter a string at first. The Python eval function must then be invoked each time to compute the function value for different values of x.

Sample I/O:

Enter a function $f(x)$:

$x+2$



Save your program as **question4.py**.

Weighting of Marks

- Question 1: 15
- Question 2: 25
- Question 3: 30
- Question 4: 30

Submission

This assignment does not accept online submissions. Contact your instructor for additional instructions.

Done