FMSP | Let maths take you further

The Further Mathematics Support Programme

An Introduction to Python

Before studying this task sheet, it would be beneficial to study the Algorithms and Pseudocode tasksheets from the same section.

Python is a powerful language used by sites like YouTube and Dropbox. Many economists, scientists and engineers use Python for their mathematical work.

You don't need to install any software to code in Python. There is an online workspace called *CodeAcademy Python* which can be accessed directly in your internet browser. You can quickly enter code and run it to check it works correctly.

Access the workspace at **http://labs.codecademy.com/#:workspace**

In any programming task, it is important to type the code very precisely to ensure if executes the command that you intend – watch out for missing quote marks and spaces, for example.

Task 1

Type the following code into the Python workspace, being careful to include the indents on lines 7 and 9, as these are important (produce an indent by pressing the 'tab' key). As you type in the lines of code, try to work out what actions the code will perform and what the output might be.

Then click 'run' and see the results.

```
print 5+2
print "I can code"
a=10
a=a+6
print a
if 7<2:
    print "7 is less than 2"
else:
    print "7 is not less than 2"
```

Task 2

Look at the Python code below and its output on the right. Try to get an impression of what the code is doing.

```
def isprime(n):
    primetrue = 1
    for i in range (2,n):
        if n % i == 0:
            primetrue = 0
    if primetrue == 1:
        print str(n) + " is prime!"
    else:
        print str(n) + " is not prime."

for j in range (2,20):
    isprime(j)
```

```
2 is prime!
3 is prime!
4 is not prime.
5 is prime!
6 is not prime.
7 is prime!
8 is not prime.
9 is not prime.
10 is not prime.
11 is prime!
12 is not prime.
13 is prime!
14 is not prime.
15 is not prime.
16 is not prime.
17 is prime!
18 is not prime.
19 is prime!
```

Now study the output of the code – is it what you expected?

What is the code doing? Why has the pattern stopped at 19?

Task 3

(Taken from **http://www.pythonforbeginners.com/code-snippets-source-code/python-guessing-game/**)

Study the following code – what do you think it is designed to achieve?

```
import random
n=random.randint(1,99)
guess=int(raw_input("Enter an integer from 1 to 99:"))
while n!="guess":
    print
    if guess<n:
        print "guess is low"
        guess=int(raw_input("Enter an integer from 1 to 99:"))
    elif guess>n:
        print "guess is high"
        guess=int(raw_input("Enter an integer from 1 to 99:"))
    else:
        print "you guessed it!"
        break
    print
```

Try the code and verify what the code achieves.

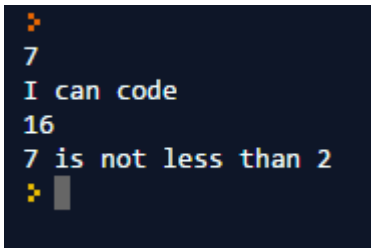
Further Reading

- You can sign up for **free online lessons** in Python through Codecademy;
- Samples of simple codes in Python can be found online at **Python for Beginners**;
- **Project Euler** offers a series of challenging mathematical/computer programming questions.

Solutions

Task 1

The output should be:



The 'print' command outputs whatever is written after the word 'print'.

The line a=a+6 may seem strange mathematically, as solving this equations would lead to the statement 0 = 6 which is not true! The line actually means 'a is increased by 6 from its current value to give a new value of a'.

There is also an 'If- Else' command (elif) which offers the option of a different output depending on the input.

Task 2

The first section of code defines a function that looks at whether a value is prime. It uses the '%' command, which gives the remainder when dividing. For example, in Python:

23 % 5 = 3

36 % 5 = 1

The second section applies that function to the values from 2 to 19 inclusive. This is indicated by the command (2, 20)

Task 3

The code helps you to guess a randomly generated number between 1 and 99 by prompting that your current guess is too high or too low. The first lines of output look similar to this: