SCIE1000, Computing Tutorial Week 4, Semester 1, 2011.

Aims

The aims of this computing tutorial are:

- To understand the concept of loops in programming and how they fit in with the idea of flow of execution.
- To get some experience with using *while* loops in Python.

Overview

[Ref: Python Notes Section A.5]

In the Week 3 Computing Tutorial, the idea of *flow of execution* of a computer program was discussed. This week, we expand on this concept to allow certain lines in a program to be executed repeatedly depending on whether or not a (Boolean) condition is True or False (recall the Week 3 Computer Tutorial and the Python Notes in Appendix A.4 of the lecture notes if you need a reminder about Boolean statements). Ask your tutor if you are confused about anything we cover this week.

Questions

[Ref: Python Notes Section A.5.1-A.5.2]

1. Read Sections 5.1 and 5.2 of the Python Notes carefully, making sure you can follow what is happening in Example 5.2.1. What is the output from the following segments of Python code? In each case, work it out for yourself and then type it into Python to verify your answer:

```
k = 1
while k <= 10:
    print k
    k = k + 1
```

```
a = 2
b = 50
while a < b:
    a = a * 3
print a,b
```

2. *[Ref: Python Notes Section A.5.3]* Indicate which of the following segments of Python code are infinite loops and explain why (again, work this out for yourself and then investigate using Python. Note that `control-C` interrupts an infinite loop.):

```
j = 1
while j <= 10:
    print j
    j = j + 1
```

```
a = 2
while a != 20:
    print a
    a = a * 2
```

3. *[Ref: Python Notes Section A.5.2]* Write a Python program that prints out powers of two for the integers, starting with 1, until the power of two value exceeds 3000.

4. *[Ref: Python Notes Section A.5.4]* Study Python Example 5.4.1 from the Python Notes. Type this program in and make a modification to the program so that, when a and b have the same value, the program prints out "`Wooot! a and b are equal!`". (Hint: use an `if` statement.)

5. Over the last two weeks we have developed a Python program that uses two formulae to estimate the human body surface area (BSA) given the weight and height of a person, and also estimates the value of the Widmark factor r for males and females. This week we will extend what this program does. First, take a copy of your program from last week and give it a new name. We will work on this new copy of the program.

   (a) Modify your program so that (in addition to what it did before):

   - The following, modified menu is printed at the start:

     ```
     Please select from this list of options:
       Enter 1 to calculate body surface area.
       Enter 2 to estimate the time for BAC to return to 0.
     Your choice?
     ```

   - If the user chooses Option 2, then:
     - the user is asked to enter the number of standard drinks consumed
     - the user is asked to enter the gender, weight and height of the drinker
     - the program prints the estimated value of the Widmark factor r
     - the program estimates the time for BAC to return to 0 using the Widmark formula and the value of r calculated in the program

   (b) Run your program for a female of height 155 cm and weight 38.5 kg, and also for a male of height 188 cm and weight 107 kg, each consuming 4 standard drinks. Check your answers 'by hand'.

6. Modify your program so that:

   - instead of entering the number of standard drinks consumed, the user is asked to enter the **maximum** number of drinks consumed
   - it uses a loop to print out the time taken for BAC to return to 0 for each possible whole number of drinks consumed, between 1 and the chosen maximum number of drinks
   - the output includes meaningful messages, so it can easily be interpreted.

7. **Assessment Question (1.5%): BSA/BAC to 0 program.**

   Make sure that your program from the previous question is commented, has sensible variable names, and includes useful output messages. Test your program on the following cases, where appropriate comparing the output values with hand calculations you have done previously, to test the program.

Case	Maximum drinks	Weight (kg)	Height (cm)	gender
BSA	–	38.5	155	female
Time for BAC to 0	5	38.5	155	female
Time for BAC to 0	5	107	188	male

   This program will contribute 1.5% towards your final assessment for SCIE1000. **To receive these marks, you must demonstrate your program and its output to a tutor during your tutorial.** Program output, including text messages and correct values, are together worth up to 1.0%. Appropriate comments and variable names are together worth 0.5%.