SCIE1000, Computing Tutorial Week 9, Semester 1, 2011.

Aims

The aims of this computing tutorial are to build on the Python programming skills you have developed in recent weeks, in the context of an issue in science. **Note that** the programs you have already written in computing tutorials will certainly help with developing this program.

1. In the tutorial sheet this week, we considered a number of questions relating to degradation of alcohol (ethanol) in post-mortem tissue samples. In this class we will write a Python program that investigates forensic cases like the one on the tutorial sheet. Specifically, write a Python program that:

   - Prompts the user to enter:
     - the time (in **hours**) at which the person died, where $t = 0$ is the time at which the person ceased consuming alcohol.
     - the time (in **hours**) at which the post-mortem tissue sample was analysed. (Again, $t = 0$ at the time of ceasing alcohol consumption.)
     - the measured BAC in the post-mortem tissue sample.
   - models the BAC at all times from time $t = 0$ (ceasing alcohol consumption) to the time at which the tissue sample is analysed, and plots a graph of the BAC.
   - prompts the user to enter a time, and calculates the BAC of the tissue at that time (this time will be greater than 0, but can be before or after death).

   The program should assume that post-mortem, the tissue is stored at 25 °C and is exposed to air. Also, assume that the person metabolises alcohol at the 'standard' rate covered in class.

2. Test your program on three different cases, which you make up yourself. Compare your answers with one or more other people, or with simple hand calculations.

3. Modify your program so that it now also prompts the user to enter the weight and gender of the person, and estimates the number of standard drinks consumed by the person. (Assume that the person has a typical body shape for their gender, so the Widmark factor r equals 0.7 for males and 0.6 for females.)

4. ### Assessment Question (1.5%): CSI UQ.

   Ensure your program from the previous question is commented, has sensible variable names, includes useful output messages, and has appropriate formatting of the graph. Use your program to answer the following questions, which match Question 2 on the **tutorial** sheet for this week.

   A male weighing 80 kg consumes alcohol at time $t = 0$, and dies in a motor vehicle accident three hours later (at time $t = 3$). A post-mortem tissue sample taken 72 hours after death (at $t = 75$ hours) shows an alcohol concentration of 0.047%. Use your program to answer the following questions:

   - What was the BAC at time of death?
   - What was the alcohol concentration at time $t = 27$, one day after death?
   - If the person commenced driving 1 hour prior to death, what was the BAC at that time?
   - How many standard drinks had the man consumed?

   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%.

5. If you have spare time then you might like to do some work on your project.

The end