

Title	Assignment 3
Due	16-Mar-2012 17:00
Number of resubmissions allowed	0
Grade	100.0 (max 100.0)
Modified by instructor	07-Mar-2012 18:47

Instructions

This tutorial is about the *if* flow control statement.

Question 1

Write a program to determine whether a year is a leap year or not. A year is a leap year if (a) it is divisible by 400 or (b) it is divisible by 4 but not by 100.

Sample I/O:

```
Enter a year:
2008
2008 is a leap year.
```

Sample I/O:

```
Enter a year:
2009
2009 is not a leap year.
```

Save your program as **leap.py**

Question 2

[Reference: http://www.youtube.com/watch?v=uxPQhm_Aq-E]

Write a program to check if a set of six numbers is a pair of geographical/GPS coordinates or not, assuming the degrees/minutes/seconds form:

40°20'21" N 79°58'36" W

The six numbers represent, in sequence: latitude degrees, latitude minutes, latitude seconds, longitude degrees, longitude minutes and longitude seconds. Your program must use negative number to represent degrees in the southern and western hemispheres.

In professional software, it is never assumed that input from users is valid so you too need to do this in your programs. In this case, you want to check if the latitude degrees is between -90 and 90 (inclusive), the longitude degrees is between -180 and 180 (inclusive), the minutes are between 0 and 59 (inclusive) and the seconds are between 0 and 59 (inclusive).

Sample I/O:

```
Enter 6 numbers:
33,57,27,18,27,38
WOW! Looks like geographic coordinates!
```

Sample I/O:

```
Enter 6 numbers:
12,67,78,18,27,0
Hmmm ... looks like 6 random numbers.
```

Save your program as **coordinates.py**

Question 3

Write a program to determine the type of an animal based on the following simple classification scheme:

The skeleton is:

internal?

Fertilisation of eggs occurs:

within the body?

Young are produced by:

waterproof eggs?

The skin is covered by:

scales?

* Reptile

feathers?

* Bird

live birth?

* Mammal

outside the body?

It lives:

in water?

* Fish

near water?

* Amphibian

external?

* Arthropod

Your program must ask a series of questions to determine the type of animal. Assume that there are no errors in the input.

This type of program is a simple variant of artificial intelligence known as an **expert system** and the classification tree is known as a **decision tree**.

Sample I/O:

```
Welcome to the Biology Expert
-----
Answer the following questions by selecting from among the options.
The skeleton is (internal/external)?
internal
```

The fertilisation of eggs occurs (within the body/outside the body)?
within the body
Young are produced by (waterproof eggs/live birth)?
live birth
Type of animal: Mammal

Save your program as **biology.py**

Question 4

Write a program to automatically determine if and how 3 numbers can be used to formulate a simple $a+b=c$ equation. Note: always write the larger number of the sum first.

Sample I/O:

```
Enter 3 numbers:  
12,17,5  
The formula is: 12 + 5 = 17
```

Sample I/O:

```
Enter 3 numbers:  
3,2,1  
The formula is: 2 + 1 = 3
```

Sample I/O:

```
Enter 3 numbers:  
3,1,1  
There is no valid formula.
```

Save your program as **formula.py**

Mark Weighting

Question 1 : 25
Question 2 : 25
Question 3 : 25
Question 4 : 25

Submission

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

Done