CSC1017/19F Assignment 3B (70 Marks)

Control (if)

Learning Objectives

By the end of this assignment, you should be able to:

- Understand Boolean expressions (which evaluate to a Boolean TRUE or FALSE value) and their role in selection
- Be aware of the different forms that an if statement can take and know when to apply each of the these forms
- Be able to use if statement effectively in your programs

Assignment Instructions

This assignment involves constructing Python programs that use input and output statements, '`if`' and '`if-else`' control flow statements, and statements that perform numerical manipulation.

You may need to use additional attributes of the print statement that control what is printed at the end of each print statement (`end="\n"`) and separating each value in a list of values (`sep=" "`). For example:

```
print ("a","b","c")
```

displays "`a b c`"

```
print ("a","b","c", sep="|")
```

displays "`a|b|c`"

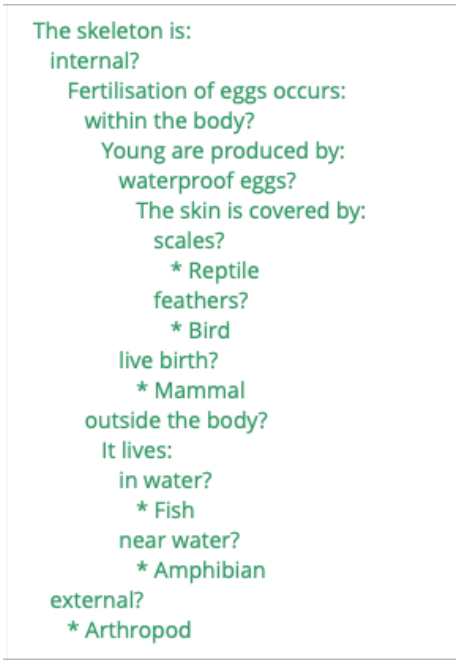
NOTE Your solutions to this assignment will be evaluated for correctness. *Assignments that follow (starting with Assignment 4) will also be evaluated for the following qualities*:

- Documentation
  - Use of comments at the top of your code to identify program purpose, author and date.
  - Use of comments within your code to explain each non-obvious functional unit of code.
- General style/readability
  - The use of meaningful names for variables and functions.
- Algorithmic qualities
  - Efficiency, simplicity

These criteria will be manually assessed by a tutor and commented upon. In future assignments, up to 10 marks will be deducted for deficiencies.

Question 1 [20 marks]

In Biology, the animal kingdom is separated into nine taxonomic ranks. Below is a very rough sketch of classification tree for animals. Write a program called '`biology.py`' to determine the type of an animal based on the following simple classification scheme:



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 IO *(The input from the user is shown in* ***bold*** *font – do not program this*):

```
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)?
waterproof eggs
The skin is covered by (scales/feathers)?
scales
Type of animal: Reptile
```

Sample IO *(The input from the user is shown in* ***bold*** *font – do not program this*):

```
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
```

Sample IO *(The input from the user is shown in* ***bold*** *font – do not program this*):

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

Question 2 [20 marks]

Write a program called `'triangle_checker.py'` that asks a user to enter the three sides of a triangle, and check if a triangle is valid. A triangle is valid if the sum of any two sides is greater than the third side (that is, it satisfies the triangle inequality). If the condition holds for all the three pairs, then a triangle is valid.

Sample IO *(The input from the user is shown in* ***bold*** *font – do not program this*):

```
Enter the first side:
3
Enter the second side:
4
Enter the third side:
5
The given sides form a valid triangle.
```

Sample IO *(The input from the user is shown in* ***bold*** *font – do not program this*):

```
Enter the first side:
6
Enter the second side:
4
Enter the third side:
12
The given sides do NOT form a valid triangle.
```

Question 3 [30 marks]

Write a program called '`age_checker.py`' to automatically determine a user's age, and whether they were born on 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 IO *(The input from the user is shown in* ***bold*** *font – do not program this*):

```
Enter your birth year:
1980
Enter the current year:
2025
You are 45 years old.
You were born in a leap year.
```

Sample IO *(The input from the user is shown in* ***bold*** *font – do not program this*):

```
Enter your birth year:
2001
Enter the current year:
2025
You are 24 years old.
You were not born in a leap year.
```

Submission

Create and submit a Zip file called '`ABCXYZ123.zip`' (where ABCXYZ123 is YOUR student number) containing `biology.py`, `triangle_checker.py` and `age_checker.py`.

NOTES:

1. FOLDERS ARE NOT ALLOWED IN THE ZIP FILE.
2. As you will submit your assignment to the Automarker, the Assignment tab will still say "Not Complete". THIS IS COMPLETELY NORMAL. IGNORE IT.