Decision Making

Conditional Statements

Conditional statements are used in making a decision about which piece of code should be executed. In many cases we prefer to execute code only when certain conditions are met.

e.g. if it is sunny then we will go for a walk

If you have enough money you can buy the items

We can now explore the flow control statements in Python ..

The "if" Statement

Structure of an if statement:

- The "if" keyword

- A conditional statement (evaluates to True or False)

- A colon

- the clause (an indented block of code)

The clause executes if the condition is True, but is skipped otherwise

```
if <condition>:
        clause


e.g.


if name == 'John':
        print ('Hello, John')
```

Now, let's modify our earlier program that asked a user their name, to say hello only if the user enters a particular name e.g. John

The "else" Statement

In an "if" statement we know what happens if the condition is "True". What about when the condition is "False". What happens ???

We can chose to include a statement that should be executed when the condition is "False"

Syntax of an if-else statement:

If <condition>:
    statement(s)
else:
    statement(s)

e.g.

If name== 'John':
    print ('Hello, John')
else:
    print ('Who are you?')

Task:

Now, let's modify our program to say "Hello" if the entered name is "John" but to display an alternate message if any other thing is entered

Quiz:

Does the else statement have a condition?

The "elif" Statement

In certain situations, we may want try another condition, if the previous one was not True. In this case we use the "elif" statement. The format of "elif" is:

Syntax of the if-elif statement:

```
if <condition>:
      clause
elif <condition>:
      clause
```

e.g.

```
a = 5
b = 5
if b > a:
  print("b is greater than a")
elif a == b:
  print("a and b are equal")
```

Task:

For example in

```
If name== 'John':
        print ('Hello, John')
else:
        print ('Who are you?')
```

If we want to execute another statement (or block of statements) if the name is "Juliet", how do we implement this?

"elif"... a note on logical errors

We can combine several "elif" statements:

```
name = 'Juliet'
age = 1000
if name == 'John':
    print('Hi, John')
elif age < 18:
    print('You are not John')
elif age > 500:
    print('Are you sure you are human?')
elif age > 100:
    print('You are too old to be John')
```

```
name = 'Juliet'
age = 1000
if name == 'John':
    print('Hi, John')
elif age < 18:
    print('You are not John')
elif age > 100:
    print('You are too old to be John')
elif age > 500:
    print('Are you sure you are human?')
```

Does the order of the "elif" statements matter?

Compare the program on the left with the one on the right. Will they produce the same result?

Quiz:

1. What is the maximum number of clauses that can be executed in an "if-elif" statement ?

2. In an "if-elif" statement, is it guaranteed that at least one of the of the clauses will be executed?

if-elif-else

In an "if-elif" statement, it is not guaranteed that at least one of the clauses will be executed.

To modify this behaviour, we can use an "if-elif-else", this way, it is guaranteed that at least one (and only one) clause will be executed

Syntax of the if-elif-else statement:

```
if <condition>:
    clause
elif <condition>:
    clause
else:
    clause
```

```
name = 'John'
age = 30
if name == 'Juliet':
    print('Hi, Juliet.')
elif age < 10:
    print('You are not Juliet, you are a baby')
else:
    print('You are neither Juliet nor a baby.')
```

Taking it further with decision making

Think about using conditional statements with a conditions that involve combining Boolean Operators with Comparison Operators

Homework

1. Write a program that reads in 2 numeric values. Write two separate conditional statements.

In the first conditional statement, print "At least one condition has been satisfied", if the first number is less than 5 **or** the second number is an even number.

In the second conditional statement, print "No condition has been satisfied", if the first number is greater than or equal to 5 **and** the second number is an odd number".

Tip: even numbers are divisible by 2, without a remainder; while odd numbers will produce a remainder of 1, when divided by 2. Think about how to get the remainder after division.

2. You work with a financial services organisation; and you have been asked to write a program that will determine if a loan application gets approved or not. The company policy is as follows:

- The applicant must be at least 18 years old

- The amount they are applying for must not be more than half of their annual salary

- The applicant's current debt should be less that 20% of the amount that they are applying for.

Write a program that will collect the following data from an applicant: name, year of birth, loan amount requested, annual salary and current debt.

The program should display a message that informs the applicant if their loan application has been approved or not. For example, "*Congratulations Tim! Your loan application for £10,000 has been approved*" or "*Sorry Tim. Your loan application for £10,000 has been rejected.*"

3. A baggage handling company charge £2 per kg of luggage when the luggage is 50kg or less. For luggage above 50kg, they charge £5 per kg for any excess above the permitted 50kg.

Write a program to accept the luggage weight for a customer and calculate the amount of excess, if any. You program should also calculate the amount of luggage charges that the customer has to pay. Please ensure that your program prints out messages that produce a breakdown of the customers transaction in an informative way.