EMAT10007 – Introduction to Computer Programming

Exercises – Week 2. Control Flow

2.1 Conditionals

Essential Questions

Exercise 1 - if elif else

1. Create two variables, `A` and `B`, and assign a numerical value of your choice to each of the variables. Write a program that tests if `A - B` is positive, negative or zero and prints the outcome of the test to the Console in Spyder.
2. Create three variables. Each variable should be the name of a student and the value of the variable should be their score in an imaginary assignment e.g `Valentina = 75`. The pass mark for the assignment is 40. Write a program that prints a message telling the user if all, some or none of the students passed the assignment.
3. Create a variable with a string value. Write a program that prints `'<?> starts with vowel'` if the string begins with a vowel, where `'<?>` is the string value.
4. A currency trader uses the following equation to calculate the amount in US dollars (USD) for the amount the customer pays in pounds sterling (GBP):

   $$USD = GBP \times M \times R$$

   where $R = 1.38$ is the market rate and the multiplier, M is found using the table below, based on the amount paid.:

GBP	Multiplier
< 50	0.9
< 500 and ≥ 50	0.92
$< 5{,}000$ and ≥ 500	0.95
$< 50{,}000$ and ≥ 5000	0.97
$\geq 50,000$	0.98

   Write a program that prints the amount in US dollars for a given amount in pounds sterling, and the effective exchange rate $= \frac{\text{USD}}{\text{GBP}}$

Advanced Questions

(A) Suppose we have three circles in the xy-plane (Figure 1).

Circle C_1 is centred at $(0, 0)$ with radius of length 5.

Circle C_2 is centred at $(2, 1)$ and has radius of length 2.

Circle C_3 is centred at $(-5, 0)$ and has a radius of length 3.

Using conditional statements write a program which takes in the variables `x` and `y` and tells the user which circle(s) the point (x, y) is in.

How can you make your code as concise as possible?

Are there any conditions you do not have to test?

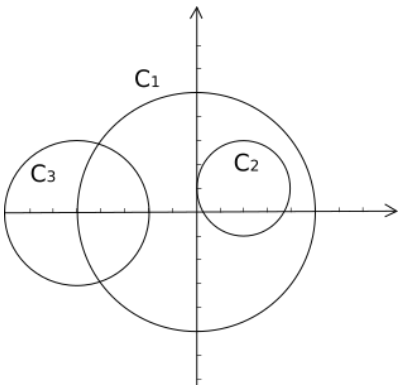

Figure 1: Overlapping circles C_1, C_2 and C_3.

2.2 User input and nested conditionals

Essential Questions

Exercise 2 - User Input

1. Write program that asks the user for a number, tests if the number is positive, negative or zero and prints the outcome of the test to the Console in Spyder.
2. Write program that asks the user for their name and prints a message telling the user what letter their name ends with e.g. `Your name ends with the letter a`

Exercise 3 - Nested conditionals

1. Create a variable that asks the user for the name of an imaginary student, then asks the user for the student's score in an imaginary assignment. The pass mark for the assignment is 40. Write a program that prints a message telling the user if the student has passed or failed, and if they have passed, also prints their grade.

Score	Grade
≥ 70	A
< 70 and ≥ 60	B
< 60 and ≥ 50	C
< 50 and ≥ 40	D
< 40	Fail

2. Build a text based adventure game by writing a program to execute the flow diagram shown in Figure 2. Your program should ask the user questions and you should use conditionals and nested conditionals to determine the flow of the game.

Advanced Questions

(A) Create two variables, `Day` and `Time`. Write a program that tells you which class you should be in based on the day of the week and time of day. Come up with a suitable output for periods where there are no classes.

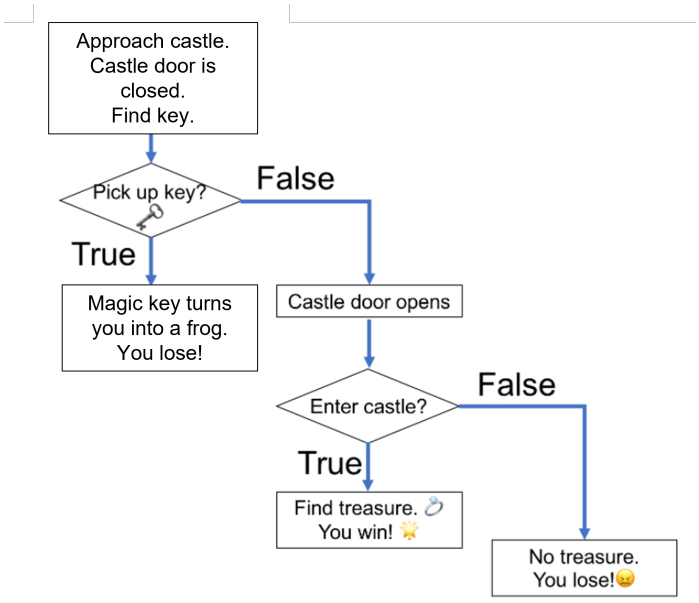

Figure 2: Flow diagram showing an example game

(B) Build your own text based adventure game in the style of the answer to Exercise 3.2. Your program should ask the user questions and you should use conditionals and nested conditionals to determine the flow of the game.

Checklist

- Check that you understand the basics: conditional statements (if, elif, else) as well as user input and nested condtiionals.
- Finish any incomplete Essential exercises for homework.
- Attend the drop-in session for one-to-one support from a Teaching Assistant if there was anything you didn't understand.