Programming I (Python)
Assignment 1

1. Discuss the following:
   (a) Compilation and Interpretation
   (b) native code and byte code
   (c) virtual machine
   (d) Variables
   (e) definition and use of variables
   (f) Data types
   (g) Data types in Python as opposed to C
   (h) Syntax
   (i) Need for **int** and **float**
   (j) Integrated development environment
2. On a first look, what appear to be some of the positive and negative features of Python as compared to C.
3. Write a program which prints `"Hello World!"` to the console.
4. Write a program which defines two variables with appropriate values and prints out their sum.
5. Write a program which takes two numbers as input representing the two perpendicular sides of right angled triangle, and prints out the length of the hypotenuse.
6. Write a program that takes two strings as inputs representing the *first name* and the *last name* of a person, and prints out the *full name*.
7. Consider the following piece of Python code:

```
a = 10
b = 4
c = 3.4
d = a / 10
e = b * c
a = a * e
s = "IIITB"
t = a + s
```

At the end of each line of the above code, investigate the type of the variable defined in that line. For each line, what can be said about the typing rules of Python from these observations.

8. Once upon a time, three friends – Abhiraj, Leon and Vigyan – go for a weekend outing. They decide upfront that they will split the expenses equally. Abhiraj buys the movie tickets online (Rs. 990). Leon pays the bus tickets (Rs. 140) and also purchases the popcorns in the interval (Rs. 150). Vigyan pays for the meal after the movie (Rs. 1100). Write a Python program to work out (and print) the due amount on each friend (note that the due could either be positive or negative).

9. Write a program that accepts a character value from the input. If the character is `'y'`, then it prints the following message:

   ```
   You said 'yes'
   Hello world!
   ```

   If anything else is pressed, then it prints the following message:

   ```
   Hello world!
   ```

   (9.py)

10. Write a program which accepts your age as an input. Based upon whether you are an child (age < 18) or an adult (age ≥ 18), it prints a set of 5 books suggested for your reading. For example, for a child, some books might be: *Noddy*, *Nancy Drew*, *Panchatantra*, *Amar Chitra Katha*, *Tintin*, *Asterix*; and for an adult, some books might be: *Anna Karenina*, *Godaan*, *Geetanjali*, *Fountainhead*, *Midnight's Children*.

    (Feel free to make you own favourite set. :)) (10.py)

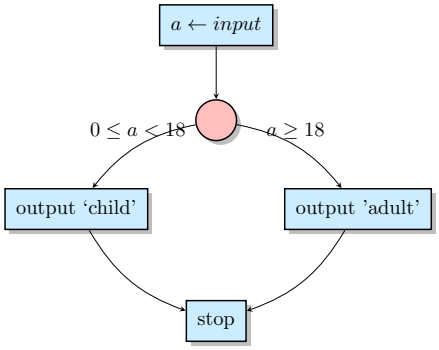
11. Write a program which accepts your study year (1, 2, 3, 4 or 5) and prints out the list of courses for that year. (11.py)

12. Write a modified version of the above program which takes as a second input, your specialisation (CSE or ECE) and prints the course lists accordingly. (12.py)

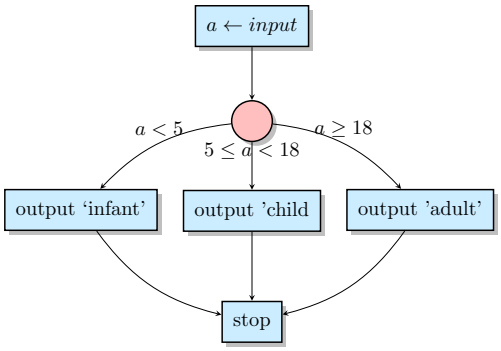
13. Write a program which prints out a number (maximum upto 999999999) in words. For example, the number 103089 would print as 'One lakh three thousand and eighty nine'. (13.py)

14. Implement the programs corresponding to the following control flow graphs:

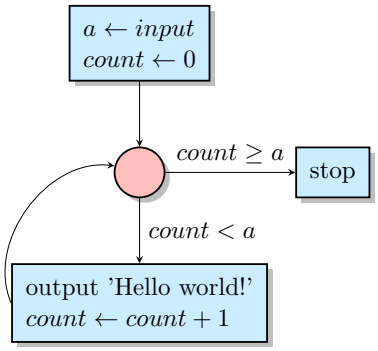
    (a) (14a.py)



    (b) (14b.py)



(c) (14c.py)



15. Draw the control flow graph of the program of question 8. Feel free to omit some of the low level details to limit the size of the diagram. (15.jpg)

16. Build a calculator program that provides the facility to do the following simple arithmetic computations on two numbers:

    1. add
    2. multiply
    3. average.

    Provide a text based menu which provides the above choices as numerical inputs. Once selected, the program accepts the two numbers one by one, and exits after printing out the result based on the chosen operation. (16.py)