ESS111 : Programming 1 (C Programming)
LAB - 5

Due: 23 December, 2020 @ 11:59 pm

Part A (to be submitted)

Problem 1: Write a program that takes as input integer n and prints all the Pythagorean triplets (where sides belonging to a triplet are printed in increasing order) with the length of sides less than or equal to n. A Pythagorean triplet is a set of three positive integers a, b and c such that $a^2 + b^2 = c^2$.
Note : Print the sides of all such possible triplets in separate lines, each in increasing order. The triplets should be further arranged in increasing order of largest side and then second largest side.
The value of n should be positive. When n is not positive, output `"Invalid input"`.
And when no such triplet exists, output `"No triplet"`.

Sample Input 1:
20

Output 1:
3 4 5
6 8 10
5 12 13
9 12 15
8 15 17

Sample Input 2:
2

Output 2:
No triplet

Sample Input 3:
0

Output 3:
Invalid input

Problem 2: Armstrong number is a number that is equal to the sum of cubes of its digits. Write a program that takes non-negative integers a and b as input and prints Armstrong numbers in the range [a,b] (both a and b are included in given range).
Note : Print Armstrong numbers in increasing order and in separate lines. In case of negative value of a or b, output `"Invalid input"`.
In case no Armstrong number exists in given range, output `"No Armstrong Number"`.

Sample Input 1:
100 400

Output 1:
153
370
371

Sample Input 2:
400 500

Output 2:
407

Problem 3: Write a program to find the grace marks for a student using **switch**. The program will take char `c` and integer n as input, where `c` is class obtained by the student and n is the number of subjects he/she has failed in. Use the following logic:

- If the student gets `f` class and the number of subjects he/she failed in is greater than 3, then he/she does not get any grace. Otherwise the grace is of 5 marks per subject.

- If the student gets `s` class and the number of subjects he/she failed in is greater than 2, then he/she does not get any grace. Otherwise the grace is of 4 marks per subject.

- If the student gets `t` class and the number of subjects he/she failed in is greater than 1, then he/she does not get any grace. Otherwise the grace is of 5 marks.

Sample Input 1:
f 3

Output 1:
15

Sample Input 2:
t 2

Output 2:
0

Problem 4: Write a program that takes input integer n and a character c, and prints the half-diamond pattern of character c which has $2n$-1 rows.
Note : The value of n should be positive. When n is not positive, output `"Invalid input"`.

Sample Input 1:
4 a

Output 1:
a
a a a
a a a a a
a a a a a a a
a a a a a
a a a
a

Sample Input 2:
2 *

Output 2:
*
* * *
*

Part B (need not be submitted)

1. Write a program to print the multiplication table of the number entered by the user.
2. According to a study, the approximate level of intelligence of a person can be calculated using the following formula:

   i = 2 + (y + 0.5 x)

   Write a program that will produce a table of values of i, y and x, such that y varies from 1 to 6 and for each value of y, x varies from 5.5 to 12.5 in steps of 0.5.

3. Explain the output obtained when the following piece of code is executed?

```
char a,b;
a = b = 127;
a++;
if (a > b)
 ("Increment works as expected");
else
 printf("Something is wrong");
```

4. Consider the following piece of code.

```
int val = 99, testVal = 1;
if ( !  testVal && val++) {
 val = 299;
}
printf("Val is %d ", val);
```

What is the output when the above is executed?

5. What is the value of test when the following is executed?

```
int test = 1234;
test ∧= test;
```