Birla Institute of Technology & Science, Pilani, K. K. BIRLA Goa Campus
Computer Programming (CS F111)
Second Semester 2017-2018
Lab-3 (Shell - Scripting)
Finish your section's question and make it available in your system before the starting of your Lab [it carries 2 marks out of 6]

Question #1 [For Section 1, 2 and 3]

Write a shell program which takes a filename as argument, which contains 3 numbers as input from the user. The first number is the principal (P), the second number is the rate of interest (R) and the third number is the period. The program should calculate the compound interest and store it in compound.txt. It should also display "invalid input" if any of the entered numbers are not valid.
Formula for computing Compound interest is:

$$CI = P\left(1 + \frac{R}{100}\right)^{T}$$

Where,
P is principle amount, ***R*** is the rate and ***T*** is the period

Input file: **input.txt**
100
4
5

Output file : **compound.txt**
121.665

Question #2 [For Section 4, 5 and 6]

Write a shell script which takes a filename as argument, that contains integer numbers between 0 to 99. The program should read each of these numbers and find whether the number is HAPPY number or not. The program prints the HAPPY numbers and stores them in a file named happy.txt.
A Number is said to be HAPPY when the sum of squares of its digits reduces to one.
For example, 19 is happy, as the associated sequence is:

- **$1^2 + 9^2 = 82$**
- **$8^2 + 2^2 = 68$**
- **$6^2 + 8^2 = 100$**
- **$1^2 + 0^2 + 0^2 = 1$.**

Input file: **input.txt**
7
12
19
27
28

Output file: **happy.txt**
7
19
28

Question #3 [For Section 7, 8 and 9]

Write a shell script which takes a filename as argument, that contains integer numbers between 0 to 500. The program should read each of these numbers and find whether the number is STRONG number or not. The program prints the STRONG numbers and stores it in a file named strong.txt.

*Definition of **STRONG** Number: A number is called strong number if the sum of the factorial of its digits is equal to the number itself.*

Examples:

N = 145

Sum of digit factorials = 1! + 4! + 5!

= 1 + 24 + 120

= 145

Number 145 is a strong number

Input file: **input.txt**

1
40
2
89
145

Output file **: strong.txt**

1
2
145

Question #4 [For Section 10, 11 and 12]

Write a shell script which takes a filename as argument which contains an integer number N between 1 and 500. The program should read the number N and find all the TWIN prime numbers between 1 and N. The program prints all the TWIN prime numbers and store in a file prime.txt.

Definition of TWIN Prime Number:

*A twin prime is a prime number that is either **2** less or **2**more than another prime number— In other words, a twin prime is a prime that has a prime gap of **two**.*

The first few twin prime pairs are: (3, 5), (5, 7), (11, 13), (17, 19), (29, 31), (41, 43), (59, 61), (71, 73), (101, 103)

Input file: **input.txt**

20

Output file: **prime.txt**

3 5
5 7
11 13
17 19