THE UNIVERSITY OF THE WEST INDIES
Department of Computing
COMP1126–Introduction to Computing I

Lab 3

1. Write a function power in python (not recursive) that raises an integer n to its n^{th} power and returns that value. If n is less than or equal to 0 then the function should return 0.

```
e.g.
     power(3)   =    3**3 =    27
     power(4)   =    4**4 =    256
```

2. Write a recursive function `sumSeries` (using the power function from part 1) which computes the following value for an input integer n:

   $1^1 + 2^2 + 3^3 + 4^4 + \ldots + n^n$

   Therefore,

   $sumSeries(4) = 4^4+3^3+2^2+1^1+0^0$

   Hint:

   Base case: n <= 0 => 1
   Recursive call: `sumSeries(4)=> power(4)+sumSeries(3)`

3. Write recursive functions in python that calculate `div` and `mod`.
   `div` takes two integers as input and keeps on subtracting the second from the first until the first number becomes less than the second number. The function keeps a track of how many times the second number is subtracted from the first and returns that number as the answer. `mod` also takes two integers as input and keeps on subtracting the second from the first until the first number becomes less than the second number. When the first number becomes less than the second, the value of the first number is the answer.

4. Two functions `lastDigit` and `allButLast` are given below. Given a number n as an argument the function `lastDigit` returns the last digit of that number and `allButLast` returns the number with its last digit taken off. Write a recursive function `sumDigits` which uses these two functions and sums all digits in a given number.

   For example, 234 will be 2+3+4, hence 9 will be returned.

```
sumDigits(234) => sumDigits(23)     + 4
                  sumDigits(2)    + 3
                  2
               =>  9
```

   Given a number n extract the last digit and call the function with an argument from which the last digit has been removed.

```
def lastDigit(x):
    return mod(x,10)

def allButLast(x):
    return div(x,10)
```

5. Write a python function `is_valid` that checks if the input is a valid Student id number. Valid student Id's are in the range 1000-6999 and the sum of their digits should be divisible by 7. If the id number is valid return True otherwise return False.