Programming Assignment

1. Find the integer exponent such that base**exponent is closest to num. Note that the base**exponent may be either greater or smaller than num. In case of a tie, return the smaller value. Returns the exponent.

```
def closest_power(base, num):
    '''
    base: base of the exponential, integer > 1
    num: number you want to be closest to, integer > 0
    '''
    #Your code
```

2. Return dot product of two lists. Result is sum of multiplication of corresponding index values.

```
def dotProduct(listA, listB):
    '''
    listA: a list of numbers
    listB: a list of numbers of the same length as listA
    '''
    #Your code
dotProduct([ 1, 2, 3, 4] , [5, 6, 7, 8]) gives 70
dotProduct([2, 3, 4], [6, 7, 8]) gives 65
```

3. The inverse of a dictionary d is another dictionary whose keys are the unique dictionary values in d. The value for a key in the inverse dictionary is a sorted list of all keys in d that have the same value in d.

```
def dict_invert(d):
    '''
    d: dict
    Returns an inverted dictionary
    '''
   #Your code
Original - {'a': 3, 'c': 2, 'b': 2, 'e': 3, 'd': 1, 'f': 2}
Inverted - {1: ['d'], 2: ['c', 'b', 'f'], 3: ['a', 'e']}
```

4. Write a recursive Python definition that inputs a number and calculates and return the sum of its digits

```
def sumDigits(N):
    '''
    N: a non-negative integer
    calculate and return the sum of its digits
    '''
```