ADDIS ABABA SCIENCE AND TECHNOLOGY UNIVERSITY

COLLEGE OF ELECTRICAL AND MECHANICAL ENGINEERING

DEPARTEMENT OF ELECTRICAL AND COMPUTER ENGINEERING

Advanced Programming Assignment I

Stream： [Computer Engineering]

Secton： [A]

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Class Year： [5th]

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1#

```
def cube(x):
 return x*x*x
```

#2

```
def triangle(h,w):
  return 0.5*h*w
```

#3

```
def rectangle(h,w):
  return h*w
```

#4

```
def Line(m,x,b):
  return m*x+b
```

#5

```
def intersect(m1,b1,m2,b2):
  if m1 == m2:
     return 0
  else:
     return 1
```

#6

```
def factorial(n):
  if n == 1:
    return n
  else:
    return n*factorial(n-1)
```

#7

```
def fibonacci(n):
  if n <= 1:
    return n
  else:
    return(fibonacci(n-1)+ fibonacci(n-2))
```

#8

a)

```
def isprime(num):
    for n in range(2,int(num*0.5)):
      if num%n==0:
          return False
    return True
```

b)

```
def getSum(n):
   sum = 0
   for digit in str(n):
     sum += int(digit)
   return sum
```

#9

```
def ascending(n):
    x = str(n)
    x = ' '.join(sorted(x))
    x = int(x)
  return x
```

#10

```
def marklist(n):
    print('Enter the marks')
    i=0
    students=0
    marks=[n]
    while i < n:
        mark=float(input('student ' + str(i) + ' mark '))
        marks.append(mark)
        if mark >= 20:
            students+=1
        i=i+1
      print('number of students who scored above 20 are: ' + str(students))

number=int(input('Enter the numner of students '))
marklist(number)
```

#11

```
def ismobile(digit):
    isit= str(digit)
    if isit[0] == '9':
        print('mobile')
    else:
        print('fixed phone')

digits=int(input('Enter the phone number '))
ismobile(digits)
```

```
#12
def maxmin(size):
    print('Enter the numbers: ')
    i = 0
    nums = []
    while i < size:
        num = float(input())
        nums.append(num)
        i += 1
    print('max number is: ' + str(max(nums)))
    print('min number is: ' + str(min(nums)))


size = int(input('Enter the size:'))
maxmin(size)
```

```
#13

def reverser(num):
    reverse=0
    while num > 0:
        remainder = num%10
        reverse = (reverse * 10)+remainder
        num=num//10
    return reverse

print('the reverse is: %d'%reverser(int(input('Enter the number: '))))
```

```
#14

import math
def gcdfinder(x,y):
    return math.gcd(x, y)

x=int(input('Enter the first number: '))
y=int(input('Enter the first second: '))
print("The gcd of %d and %d is : "%(x,y), end="")
print(gcdfinder(x,y))
```

```
#15

import math
def lcmfinder(x,y):
    return math.lcm(x, y)

x=int(input('Enter the first number: '))
y=int(input('Enter the first second: '))
print("The lcm of %d and %d is : "%(x,y), end="")
print(lcmfinder(x,y))
```

```
#16
def summation():
    sum=1/3
    n=3
    while n < 100:
        sum=sum+(n/n+2)
        n=n+2
    return sum
print(summation())
```

```
#17
def isb(arr):
    i=1
    sum=0
    while i <= 9:
        sum=sum+int(arr[i-1])*i
        i+=1
    return sum%11
number=input('Enter the nine digit number : ')
checksum=str(isb(number))
print(number+checksum)
```

```
#18
import math
def expon(x):
    i=1
    sum=1
    while i <= 100:
        sum=sum+(math.pow(x,i)/math.factorial(i))
        i+=1
    return sum
print(expon(50))
#or print(math.exp(x))
```

```
#19
def isleap(year):
    if (year % 400 == 0) and (year % 100 == 0):
        print( "%d is a leap year"%year)
    elif(year % 4 == 0 ) and (year % 100 != 0):
        print( "%d is a leap year"%year)
    else:
        print( "%d is not a leap year"%year)

year=int(input("Enter the year: "))
isleap(year)
```

```
#20
def largeoccurrence(num ,maxnum):
    count=0
    while num > 0:
        if num % 10 == maxnum:
            count+=1
        num=num//10
    return count
nums=input("Enter the number: ")
digit=int(nums)
maxnum=int(max(nums))
print("the Largerst number is %d"%maxnum)
print("the occurrence count is %d"%largeoccurrence(digit , maxnum))
```

```
#21
import math
def inrange(low,high):
    for x in range(low,high):
        sum=0
        temp=x
        while temp > 0:
            num=temp%10
            sum=sum+math.pow(num,3)
            temp=temp//10
        if sum == x:
            print(x)
low=int(input("Enter the lower limit: "))
high=int(input("Enter the highest limit: "))
inrange(low,high)
```

```
#22
def counter():
    x=0
    while(int(x)>=0):
        x=input("Enter a number: ")
        if int(x) > 0:
            print("the number of digits %d is %d"%(int(x),len(x)))

counter()
```

```
#23
def primes(n):
	prime=0
	for i in range(2,n,1):
		flag=True
		for j in range(2,i):
			if(i%j==0):
				flag=False
				break
		if flag:
			prime+=1
	return prime
limit=int(input("Enter the limit: "))
print("there are %d prime numbers between 2 and %d"%(primes(limit),limit))
```

```
#24
n=int(input("Enter number: "))
divisor= []
sum=0
for i in range(1,n):
	if(n%i == 0):
		divisor.append(i)
		sum=sum+i
if(sum == n):
	print("%d is a perfect number and the divisors are "%n , divisor )
else:
	print("%d is not a perfect number"%n)
```

```
#25
print("Enter the numbers: ")
pos,neg,sum=0,0,0
ave=0.0
x=1
while x!=0:
	x=int(input())
	if(x>0):
		pos+=1
	elif(x<0):
		neg+=1
	sum=sum+x
ave=sum/(pos+neg)
print("the occrrence of positive number is: %d"%pos)
print("theoccurence of negative number is: %d"%neg)
print("the average is: %d"%ave)
```

```
#26
def calc(tui):
	sum=float(tui)
	for i in range(0,10):
		sum=sum+(sum*0.05)
	print("the total tuition after 10 years is: " ,sum)
	prev=sum
	for i in range(0,3):
		sum=sum+(sum*0.05)
		prev=prev+sum
	print("the 4 year total tutition 10 years form now will be: ",prev)
tuition=input("Enter the tuition: ")
calc(tuition)
```

```
#27
print("1: Kilogram to pound")
print("2: miles to kilometer")
print("3: hours to minute")
x=int(input("select : "))
if x ==1 :
	inp=float(input("Enter the value to be converted : "))
	val=inp*2.204
	print("%fkg is equal to %f pound"%(inp,val))
elif x == 2:
	inp=float(input("Enter the value to be converted : "))
	val=inp*1.609
	print("%f miles is equal to %f KM"%(inp,val))
elif x==3:
	inp=float(input("Enter the value to be converted : "))
	val=inp*60
	print("%f Hours is equal to %d Minutes"%(inp,val))
else:
	print("wrong input")
```

```
#28
x=int(input("Enter the number of students: "))
i=1
namelist=[]
scorelist=[]
sortedlist=[]
while i <= x:
	name=input("Enter the name of student %d: "%i)
	score=int(input("Enter the score of student %d: "%i))
	namelist.append(name)
	scorelist.append(score)
	i+=1
sortedlist=sorted(scorelist)
secondhighest=sortedlist[-2]
print("student with the highest score is", namelist[scorelist.index(max(scorelist))] , "with
```

```
score of %d"%max(scorelist))
print("student with the second highest score is", namelist[scorelist.index(secondhighest)], "with score of %d"%int(secondhighest))
```

```
#29
x=int(input("Enter the number of students: "))
i=1
namelist=[]
scorelist=[]
while i <= x:
    name=input("Enter the name of student %d: "%i)
    score=int(input("Enter the score of student %d: "%i))
    namelist.append(name)
    scorelist.append(score)
    i+=1
print("student with the highest score is", namelist[scorelist.index(max(scorelist))] , "with score of %d"%max(scorelist))
```

```
#30
counter = 0
for num in range(100, 201):
    if (num%5==0 and num%6!=0) or (num%5!=0 and num%6==0):
        counter += 1
        print(num, end=(" " if counter < 10 else "\n"))
        if counter == 10:
          counter = 0
```

```
#31
counter = 0
for num in range(33, 127):
    counter += 1
    print(chr(num) ,end=(" " if counter < 10 else "\n"))
    if counter == 10:
        counter = 0
```

```
#32
a)
for i in range(1,7):
    j=6
    while j!=0:
        if(j > i):
            print(' ', end = '    ')
        else:
            print(j, end = '    ')
        j-=1
    print("\n")
```

```
b)
num = 6
k = 1
for i in range(1, num+1):
    k += 2
    for j in range(1, k):
        print(end=" ")

    for j in range(1, (num - i + 2)):
        print(j, end=" ")
    print()
```

```
#33

def pyramid(num):
	k = 14
	space = num * 2
	for i in range(1, num+1):
		# for j in range(1, num-i+1):
		#	print(end=" ")

		for k in range(1, space):
			print(end=" ")

		space -= 2
		for j in range(i, 0, -1):
			print(j, end=" ")
		for j in range(2, i+1):
			print(j, end=" ")
		print()
num = int(input('Enter Integer Number Between 1 and 15: '))
if num >= 1 and num <= 15:
	pyramid(num)
else:
	print('Invalid Input')
```

```
#34
column = 8
k = column * 2
for i in range(column):
	column = (7-i)*4
	n = 0

	for space in range(1, k):
		print(end=" ")
	k -= 1

	for j in range(1, k):
		print(end="    ")
	for b in range(i+1):
		a = 2**n
		print(a, end="    ")
		n += 1
	n -= 2
	for b in range(i):
		a = 2**n
		print(a, end="    ")
		n -= 1
	print()
```

```
#35
def InterestCalculator(amount, years):
    print('Interest Rate        Monthly Payment         Total Payment')

    i = 5
    while(i <= 8):
        monthlyInterestRate = i/1200
        x = amount * monthlyInterestRate / \
            (1-1/math.pow(1 + monthlyInterestRate, years*12))
        monthlyPayment = "{:.2f}".format(x)
        y = x*12*years
        total_payment = "{:.2f}".format(y)
        rate = "{:.3f}".format(i)

        print(rate, '%                ', monthlyPayment,
              '                    ', total_payment)
        i += 0.125


loanAmount = float(input('Loan Amount: '))
numYears = int(input('Number of Year: '))
InterestCalculator(loanAmount, numYears)
```

```
#36

conversion_table = {0: '0', 1: '1', 2: '2', 3: '3',
                    4: '4', 5: '5', 6: '6', 7: '7',
                    8: '8', 9: '9', 10: 'A', 11: 'B',
                    12: 'C', 13: 'D', 14: 'E', 15: 'F'}


def decimalToHexadecimal(decimal):
    num = decimal
    hexadecimal = ''
    while(decimal > 0):
        remainder = decimal % 16
        hexadecimal += conversion_table[remainder]
        decimal = decimal // 16

    print("The hexadecimal form of", num,
          "is", hexadecimal)


number = int(input('Enter Integer number: '))
decimalToHexadecimal(number)
```

```
#37

def Euler_number():
	sum = 1
	for num in range(1, 1000):
		sum += (1/math.factorial(num))
	print(sum)


Euler_number()
```

```
#38
   def isPrime(number):
		if number > 1:
			for i in range(2, number):
				if (number % i) == 0:
					print(number, "is not a prime number")
					print(i, "times", number//i, "is", number)
					break
			else:
				print(number, "is a prime number")

		else:
			print(number, "is not a prime number")

	number = int(input('Enter a number: '))
	isPrime(number)
```

```
#39
     def isEven(number):
		if number % 2 == 0:
			print(number, 'is even')
		else:
			print(number, 'is odd')

	number = int(input('Enter a number: '))
	isEven(number)
```

```
#40
def add(list_num):
	sum = 0
	for num in list_num:
		sum += int(num)
	return sum


def difference(list_num):
	return int(list_num[0]) - int(list_num[1])
```

```
def product(list_num):
	product = 1
	for num in list_num:
		product *= int(num)
	return product


def quotient(list_num):
	return int(list_num[0]) / int(list_num[1])


while(True):
	expression = input(
		'Enter Your Expression(please don\'t use gap between numbers and operator(s))\n:=> ')
	if '+' in expression:
		list_num = expression.split("+")
		print('result = ', add(list_num))

	elif '-' in expression:
		list_num = expression.split("-")
		print('result = ', difference(list_num))

	elif '*' in expression:
		list_num = expression.split("*")
		print('result = ', product(list_num))

	elif '/' in expression:
		list_num = expression.split("/")
		print('result = ', quotient(list_num))

	else:
		print('Your expression or operator is not supported')
```

```
#41
import math
def sum_of_n_factorial(number):
	sum = 0
	for num in range(1, (number + 1)):
		sum += math.factorial(num)

	return sum


number = int(input('Enter a number: '))
result = sum_of_n_factorial(number)
print('result = ', result)
```