PYTHON RECURSIONS ASSIGNMENT

```
# Q1
def fun(n):
 if (n==11):
  return
 else:
  print(n)
 return fun(n+1)

fun(1)
```

solution:

output:

fun(11)	n==11,return nothing	1
fun(10)	n!=11,print(10),call fun(10+1)	2
fun(9)	n!=11,print(9) ,call fun(9+1)	3
fun(8)	n!=11,print(8) ,call fun(8+1)	4
fun(7)	n!=11,print(7) ,call fun(7+1)	5
fun(6)	n!=11,print(6) ,call fun(6+1)	6
fun(5)	n!=11,print(5) ,call fun(5+1)	7
fun(4)	n!=11,print(4) ,call fun(4+1)	7
fun(3)	n!=11,print(3) ,call fun(3+1)	8
fun(2)	n!=11,print(2) ,call fun(2+1)	9
fun(1)	n!=11,print(1) ,call fun(1+1)	10

```
# 2
def fun(x, y) :
  if (x == 0) : return y
  return fun(x - 1, x + y)
```

```
    return fun(x - 1, x + y)

fun(4, 3)
```

solution:

output:

13

fun(10,13)	x==0 ,13
fun(1,12)	1!=0 , call fun(0,13)
fun(2,10)	2!=0 ,call fun(1,12)
fun(3,7)	3!=0 ,call fun(2,10
fun(4,3)	4!=0 ,call fun(3,7)

```
#Q3
def fun(n) :
  if (n == 0): return
  print(n % 2)
  fun(n // 2)

  fun(25)
```

solution:

output:

1

fun(0)	0==0 return nothing
fun(1)	1!=0 print(1%2) which is = 0 , call fun(0)

0

0

		fun(3)	3!=0 ,print(3%2) which is =1 ,call fun(3//2)			1				
		fun(6)	6!=0 ,print(6%2) which is =0 ,call fun(6//2)			0				
		fun(12)	12!=0 ,print(12%2) which is =0 , call fun(12//2)							
		fun(25)	25!=0 ,print(25%2) which is =1, call fun(25//2)							

```
# Q4
def fun( x, y):
  if (y == 0): return 0
  return (x + fun(x, y-1))

# (A) x+y    (B)x+x*y    (C)x*y    (D) x**y
fun(3,6)
fun(5,5)
```

		solution								
		fun(3,0)	0==0 ,return 0		--> As we got the value of fun(3,0) as '0' substiitute it					
		fun(3,1)	1!=0 ,return 3+ fun(3,0)		3+0					
		fun(3,2)	2!=0 ,return 3+ fun(3,1)		3+3					
		fun(3,3)	3!=0 ,return 3+ fun(3,2)		6+3					
		fun(3,4)	4!=0 ,return 3+ fun(3,3)		9+3					
		fun(3,5)	5!=0 , return 3+fun(3,4)		12+3					
		fun(3,6)	6!=0 ,return 3+ fun(3,5)		15+3 = 18					
		output:								
		The value of fun(3,6) is 18								
		And in the above given option it satisfies option 'C'								
		solution:								
		fun(5,0)	0==0 , return o		-->As we got the value of fun(5,0) as 0 substiute it					
		fun(5,1)	1!=0 ,return 5+ fun(5,0)		5+0					
		fun(5,2)	2!=0 ,return 5+ fun(5,1)		5+5=10					

		fun(5,3)	3!=0 ,return 5+ fun(5,2)		10+5 =15					
		fun(5,4)	4!=0 ,return 5+ fun(5,3)		15+5=20					
		fun(5,5)	5!=0 ,return 5+ fun(5,4)		20+5=25					
		output:								
		The value of fun(5,5) is 25								
		And the above given option satisfies option 'D'								

```
# Q5
def fun(n) :
  if ((n == 0) or (n == 1)) : return n
  if (n % 3 != 0): return 0
  return fun(n / 3)

fun(18)
fun(32)
```

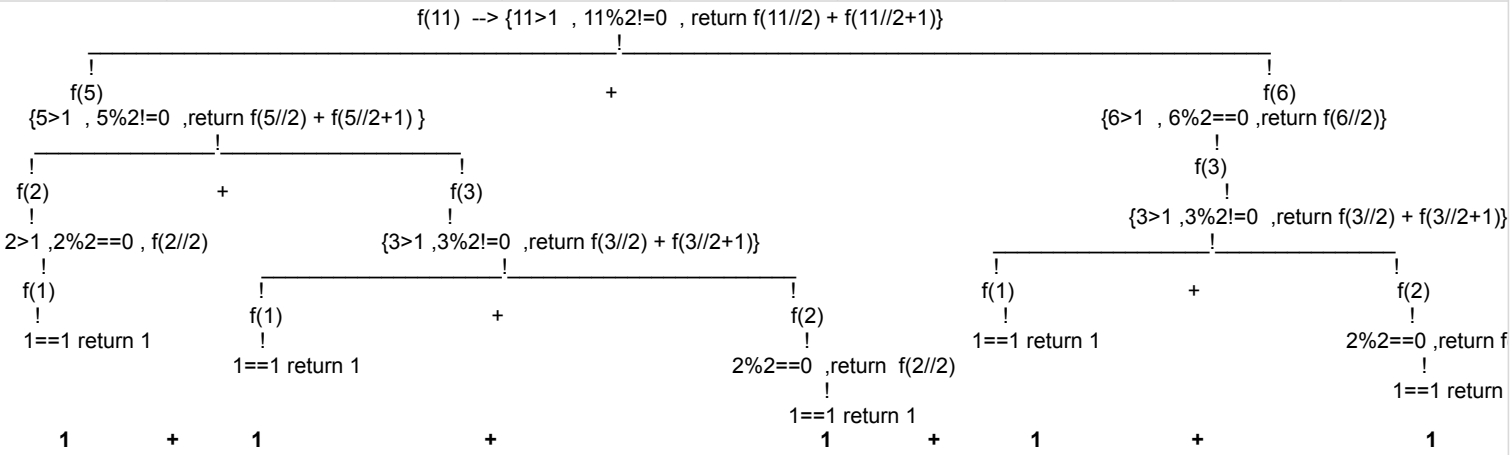
		solution:				**output:**				
						0				
		fun(0)	0==0 return 0							
		fun(2)	2!+0 or 2!=1 ,call fun(2//3)							
		fun(6)	6!=0 or 6!=1 , call fun(6//3)							
		fun(18)	18!=0 or 18!=1 ,call fun(18//3)							
		solution:								
					output:					
					1					
		fun(1)	1==1 ,return							
		fun(3)	3!=0 or 3!= 1 ,call fun(3//3)							
		fun(10)	10!=0 or 10!=1 ,call fun(10//3)							
		fun(32)	32!=0 or 32!=1 ,call fun(32//3)							

#Q6

```
def f(n) :
  if (n <= 1) : return 1
  if (n % 2 == 0): return f(n // 2)
  return f(n // 2) + f(n // 2 + 1)

f(11)
```

solution :



output:

The output is 5

```
# Q7
def foo(n, r) :
  if (n > 0):
    return (n % r + foo(n // r, r))
  else:
    return 0

foo(513, 2)
```

		solution:					**output:**			
							1			
		foo(0,2)	return 0				1			
		foo(1,2)	1>0 , (1%2==1 + foo(1//2,2)			1+0=1	1			
		foo(2,2)	2>0 , (2%2==0 + foo(2//2,2)			0+1=1	1			
		foo(4,2)	4>0 , (4%2==0 + foo(4//2,2)			0+1=1	1			
		foo(8,2)	8>0 , (8%2==0 + foo(8//2,2)			0+1=1	1			
		foo(16,2)	16>0 , (16%2==0 + foo(16//2,2)			0+1=1	1			
		foo(32,2)	28>0 , (32%2==0 + foo(32//2,2)			0+1=1	1			
		foo(64,2)	64>0 , (64%2 ==0 + foo(64//2,2)			0+1=1	1			
		foo(128,2)	128>0 , (128%2 ==0 + foo(128//2,2)			0+1=1				
		foo(256,2)	256>0 , (256%2==0 + foo(256//2,2)			0+1=1				
		foo(513,2)	513>0 , (513%2==1 + foo(513//2,2)			0+1=1				

```
# Q8
def f(n) :
  i = 1
  if (n >= 5): return n;
  n = n + i
  i+=1
  return f(n)

f(1)
```

		solution:								
					output:					
					The answer is 5					
		f(5)	5=5 ,n=5							
		f(4)	4<5 , n=4+1 ,f(5)							
		f(3)	3<5 , n=3+1 ,f(4)							
		f(2)	2<5 , n=2+1 , f(3)							
		f(1)	1<5 , n=1+1 , f(2)							

```
#Q9
def count(n):
  d = 1
  print(n)
  print(d)
  d+=1
  if (n > 1): count(n - 1)
  print(d)

count(3)
```

solution:

	print(n)=3
	print(d)=1
	d=1+1=2
	count(3-1)=count(2)
count(3)	print(d)=2
	print(n)=2
	print(d)=2
	d=2+1=3
	count(2-1)=count(1)
count(2)	print(d)=3
	print(n)=1
	print(d)=2
count(1)	print(d)=3

```
# Q10
def cfi(n) :
  if (n < 1): return
  cfi(n - 1)
  cfi(n - 3)
  print(n)
```

cfi(8)

solution:

cfi(n-3)=cfi(4-3)=cfi(1)

cfi(1-1)=cfi(0)

cfi(1)

cfi(3-3)=cfi(0)

cfi(3-1)=cfi(2)

cfi(4)

cfi(n-1)=cfi(4-1)=cfi(3)

cfi(3)

output:

3
1
4
1
2
5
1
2
3
6
1
2
3
1
4
7
1
2
3
1
4
1
2
5
8

13

```
def f(n) :
  if (n <= 1) :
    print(n)
  else:
    f(n / 2)
    print(n % 2);
```

f(1024);

solution:

f(1)	1==1 print(1)
f(2)	2>1 ,f(1) 2%2==0
f(4)	4>1 ,f(2) 4%2==0
f(8)	8>1 ,f(4) 8%2==0
f(16)	16>1 ,f(8) 16%2==0
f(32)	32>1 ,f(16) 32%2==0
f(64)	64>1 ,f(32) 64%2==0
f(128)	128>1 ,f(64) ,128%2==0
f(256)	256>1 ,f(128) ,256%2==0
f(512)	512>1 ,f(256) 512%2==0
f(1024)	n>1 ,n>1 , f(1024/2) , 1024 %2 ==0

output:

1
0
0
0
0
0
0
0
0
0