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Introduction to Computers and Programming, SE Programme

Direction Lab #13

22nd November 2021

1. Define a recursive function to check a membership in a list.

For example:

```
list_member(2, [1,2,3]) → True.
```

```
def list_member(x, num):
  if len(num) == 0:
    return False
  elif x == num[0]:
    return True
  else:
    return list_member(x,num[1:])

print(list_member(2, [1,2,3]))
```

ok

2. Define a recursive function to reverse a list.

For example:

```
list_reverse([1,2,3]) → [3,2,1].
```

```
def list_reverse(list):
  if len(list) == 0:
    return []
  elif len(list) == 1:
    return list
  return [list[len(list) -1]] + list_reverse(list[:len(list)-1])

print(list_reverse([2,4,6]))
```

ok

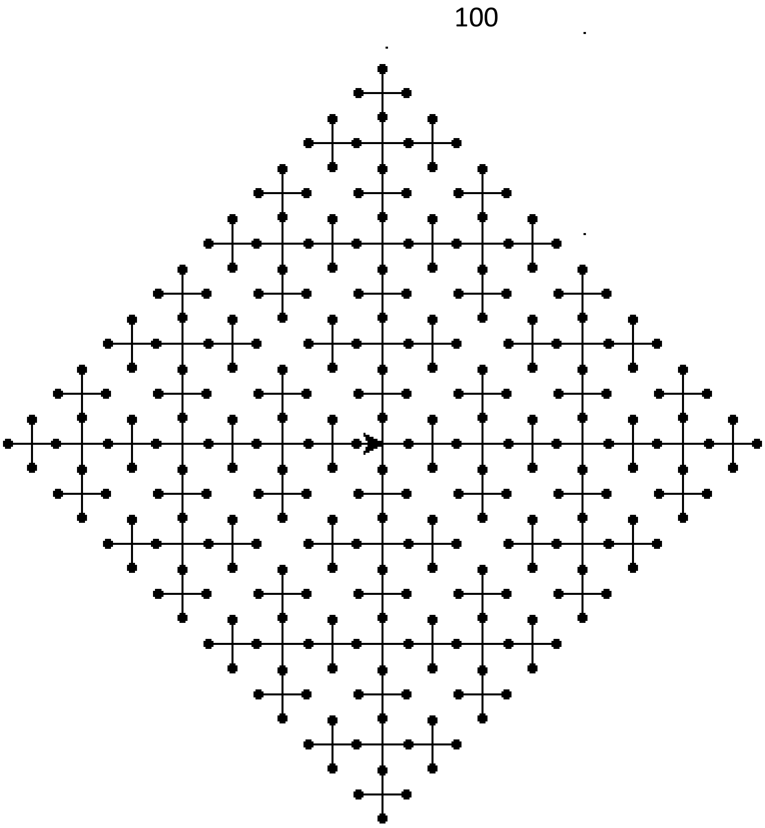
3. Define a recursive function to calculate a greatest common divisor (gcd) of two numbers, x and y, by using this Euclid definition of gcd:

gcd(x,0) = x
gcd(x,y) = gcd(y, x mod y)

```
def gcd(x,y):
   if y == 0:
      print(x)
   else:
      return gcd(y,x % y)
```

ok

4. Define a recursive function to draw a cross. For example cross(100,4), it draws:



5. Subset sum problem is an important problem in complexity theory and cryptography. The problem is this: given a set of integers, is there a non-empty subset whose sum is zero? Write a recursive function to solve this problem.

Input: -7 -3 -2 5 7
Output: Yes, (-3,-2,5) (-7,7) (-7,-3,-2,5,7)

-------------------------------------------------------

Input:  2 -3 5 8 11 23 -1
Output: No

□