

# Assignment 1

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Download all latex-tikz codes from

[https://github.com/harshagv9/C\\_DataStructures/blob/main/assignment1.tex](https://github.com/harshagv9/C_DataStructures/blob/main/assignment1.tex)

## 1 PROBLEM

(Q 49) Consider the following ANSI C program.

```
#include <stdio.h>

int foo(int x,int y, int q)
{
    if ((x<=0) && (y <= 0))
        return q;
    if (x <=0)
        return foo(x, y-q, q);
    if (y <= 0)
        return foo(x-q, y, q);
    return foo(x, y-q, q) + foo(x-q, y, q);
}

int main()
{
    int r = foo(15,15,10);
    printf("%d", r);
    return 0;
}
```

The output of the program upon execution is

## 2 SOLUTION

Answer : 60

### Explanation

This is a problem involving recursion.

The function foo gets executed recursively until the values of x and y are negative in the foo function and finally returns the value of q. Hence final value of output depends on the number of recursive foo functions at the end.

Initially at x = 15, y = 15, the inside block gets neglected and again foo functions gets executed.

Now two foo functions each with x,y are (5, 15), (15, 5) are executed.

$\text{foo}(15,15,10) = \text{foo}(5,15,10) + \text{foo}(15,5,10)$

$\text{foo}(5,15,10) = \text{foo}(-5,15,10) + \text{foo}(5,-5,10)$

$\text{foo}(15,5,10) = \text{foo}(15,-5,10) + \text{foo}(5,5,10)$

$\text{foo}(5,5,10) = \text{foo}(5,-5,10) + \text{foo}(-5,5,10)$

$\text{foo}(-5,15,10) = \text{foo}(-5,5,10) = \text{foo}(-5,-5,10) = 10$

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Hence adding the return values of all foo functions result = 60