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C-LANGUAGE PYQS

RECUSION

C-LANGUAGE

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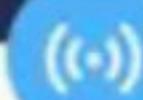
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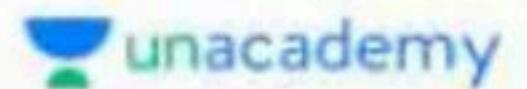
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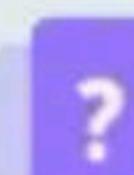
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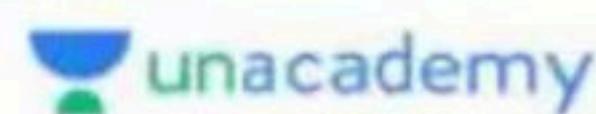
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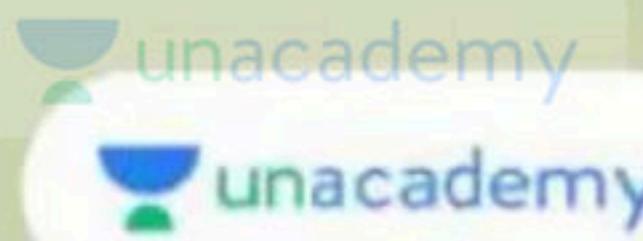
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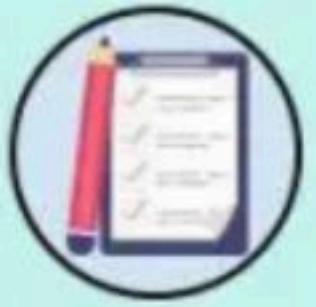
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Question GATE-1998

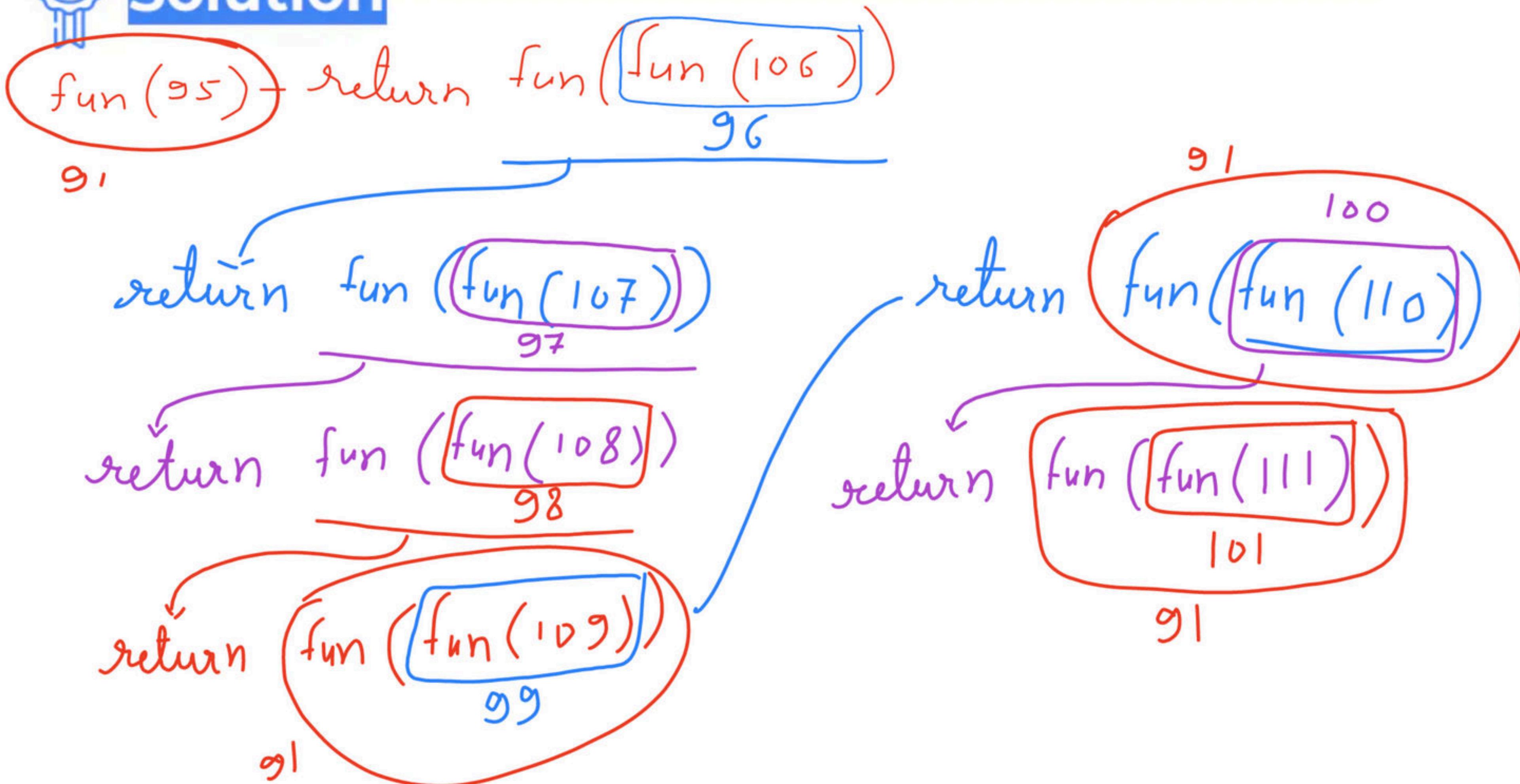
What value would the following function return for fun(95)?

```
fun(x)
{
    if(x>100) return x-10;
    else return fun(fun(x+11));
}
```

- (A) 111 (B) 101 ~~(C) 91~~ (D) None



Solution



Question GATE-2007

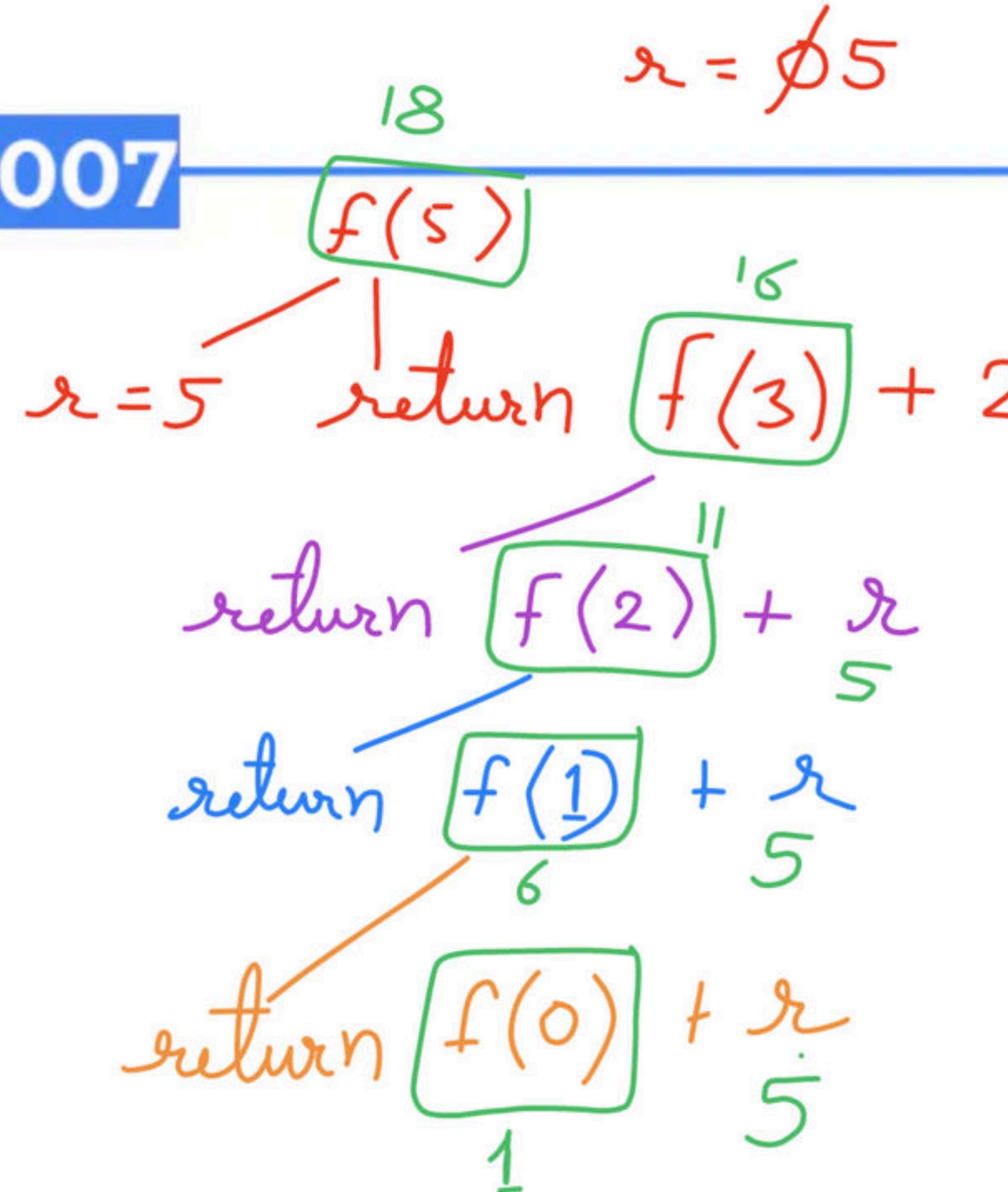
$r = \cancel{0}5$

Consider the following C function:

```
int f(int n){
    static int r=0;
    if(n<=0) return 1;
    if(n>3){
        r = n;
        return f(n-2)+2;
    }
    return f(n-1)+r;
}
```

What is the value of $f(5)$?

- A. 5
- B. 7
- C. 9
- D. 18



✓ D. 18

Question GATE-2011

Consider the following recursive C function that takes two arguments.

```
unsigned int foo(unsigned int n, unsigned int r) {  
    if (n>0) return ((n%r) + foo(n/r, r));  
    else return 0;  
}
```

What is the return value of the function `foo` when it is called as `foo(345, 10)`?

- A. 345
- B. 12
- C. 5
- D. 3

Handwritten analysis:

12 $\boxed{\text{foo}(345, 10)}$

return $(5 + \boxed{\text{foo}(34, 10)})$

return $(4 + \boxed{\text{foo}(3, 10)})$

return $(3 + \boxed{\text{foo}(0, 10)})$

The handwritten analysis shows the step-by-step evaluation of the recursive calls. It starts with the call `foo(345, 10)`, which is circled in red. The first recursive call `foo(34, 10)` is also circled in red. The value 5 is added to the result of this call. The second recursive call `foo(3, 10)` is circled in purple. The value 4 is added to the result of this call. Finally, the third recursive call `foo(0, 10)` is circled in blue. The value 3 is added to the result of this call, resulting in a final value of 12.



Solution





Question GATE-2011

Consider the following recursive C function that takes two arguments.

```
unsigned int foo(unsigned int n, unsigned int r) {  
    if (n>0) return ((n%r) + foo(n/r, r));  
    else return 0;  
}
```

What is the return value of the function **foo** when it is called as **foo(513, 2)**?

- A. 9
- B. 8
- C. 5
- D. 2

$(100000001)_2$

Solution

$\boxed{\text{foo}(513, 2)}$

\downarrow
return $(1 + \frac{\text{foo}(256, 2)})$

\downarrow
return $(0 + \text{foo}(128, 2))$

\vdots

$0 + \frac{\text{foo}(2, 2)}$

\downarrow
 $0 + \frac{\text{foo}(1, 2)}$

\downarrow
 $1 + \text{foo}(0, 2))$

Ans = 51



Question GATE-2015

Consider the following C function.

```
int fun(int n) {  
    int x=1, k;  
    if (n==1) return x;  
    for (k=1; k<n; ++k)  
        x = x + fun(k) * fun (n-k);  
    return x;  
}
```

fun(5)

$$\begin{array}{ll} & x = 1 \\ \begin{matrix} k=1 \\ k=2 \\ k=3 \\ k=4 \end{matrix} & \begin{matrix} x = x + \underset{15}{\text{fun}(1)} * \underset{15}{\text{fun}(4)} \\ x = x + \underset{26}{\text{fun}(2)} * \underset{5}{\text{fun}(3)} \\ x = x + \underset{26}{\text{fun}(3)} * \underset{2}{\text{fun}(2)^2} \\ x = x + \underset{51}{\text{fun}(4)} * \underset{1}{\text{fun}(1)} \end{matrix} \end{array}$$

The return value of *fun(5)* is 51.

<i>n</i>	1	2	3	4	5
<i>fun(n)</i>	1	2	5	15	51



Solution

fun(1) — return 1

fun(2) — $x = 1$,
 $2x = x + \boxed{\text{fun}(1)} * \boxed{\text{fun}(1)}$

fun(3) — $x = 1$
 $k=1 \quad 3x = x + \boxed{\text{fun}(1)} * \boxed{\text{fun}(2)}$
 $k=2 \quad x = 3x + \boxed{\text{fun}(2)} * \boxed{\text{fun}(1)}$



Solution

$$\begin{aligned} \text{fun}(4) &= x = 1 \\ k=1 \quad x &= x + \underset{1}{\text{fun}(1)} * \underset{5}{\text{fun}(3)} \\ k=2 \quad x &= x + \underset{2}{\text{fun}(2)} * \underset{2}{\text{fun}(2)} \\ k=3 \quad x &= x + \underset{5}{\text{fun}(3)} * \underset{1}{\text{fun}(1)} \end{aligned}$$

$n = 1$

$$\text{fun}(n) \begin{cases} 1 & n = 1 \\ 1 + \sum_{k=1}^{n-1} \text{fun}(k) * \text{fun}(n-k) & n > 1 \end{cases}$$

Question GATE-2016

What will be the output of the following C program?

```
void count (int n) {
    static int d=1;

    printf ("%d",n);
    printf ("%d",d);
    d++;
    if (n>1) count (n-1);
    printf ("%d",d);

}

void main(){
    count (3);
}
```

3 1 2 2 1 3 4 4 4

- A. 312213444
- B. 312111222
- C. 3122134
- D. 3121112

Solution

count(3)

d = 1234

✓ count(2)

✓ print(d)

✓ count(1)

✓ print(d)

✓ print(d)

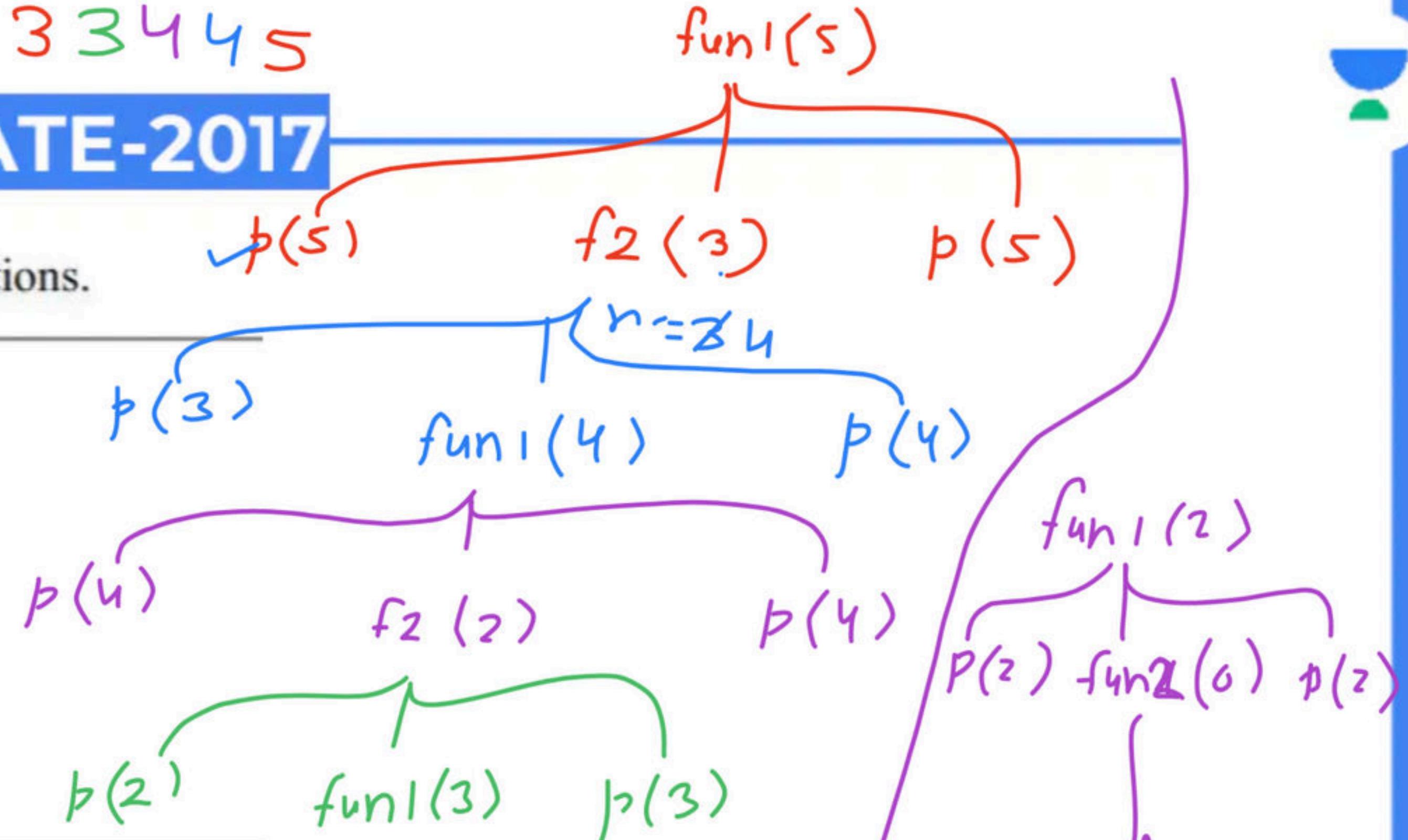


5 3 4 2 3 1 2 2 2 3 3 4 4 5

Question GATE-2017

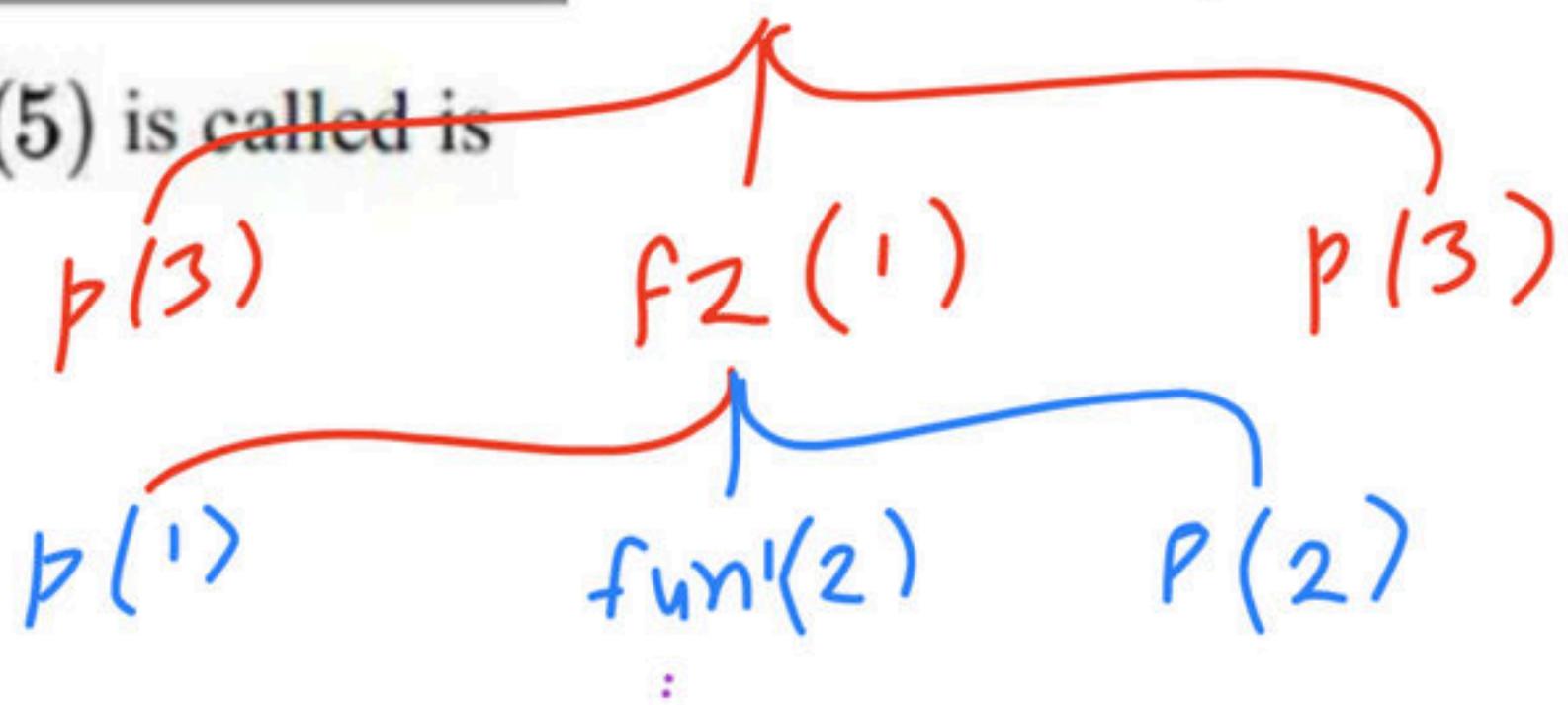
Consider the following two functions.

```
void fun1(int n) {  
    if(n == 0) return;  
    printf("%d", n);  
    fun2(n - 2);  
    printf("%d", n);  
}  
  
void fun2(int n) {  
    if(n == 0) return;  
    printf("%d", n);  
    fun1(++n);  
    printf("%d", n);  
}
```



The output printed when `fun1(5)` is called is

- A. 53423122233445
- B. 53423120112233
- C. 53423122132435
- D. 53423120213243





Solution



Question GATE-2018 $\text{calc}(4, 81)$

Consider the following C program:

```
#include<stdio.h>
int counter=0; 1 2 3 4
int calc (int a, int b) {
    int c;
    counter++;
    if(b==3) return (a*a*a);
    else {
        c = calc(a, b/3);
        return (c*c*c);
    }
}
int main() {
    calc(4, 81);
    printf("%d", counter);
}
```

 $c = \text{calc}(4, 27)$ return $(c * c * c)$ $c = \text{calc}(4, 9)$ return $(c * c * c)$ $c = \text{calc}(4, 3)$ return $(c * c * c)$ $4^3 * 4^3 * 4^3$ The output of this program is 4.



Solution



Question GATE-2019

*convert(6)**con(3)**p(0)**con(1)**p(1)**con(0)**p(1)**con(0)**p(0)*

Consider the following C function.

```
void convert(int n){  
    if(n<0)  
        printf("%d",n);  
    else {  
        convert(n/2);  
        printf("%d",n%2);  
    }  
}
```

Which one of the following will happen when the function convert is called with any positive integer n as argument?

- (A) It will print the binary representation of n and terminate
- (B) It will print the binary representation of n in the reverse order and terminate
- (C) It will print the binary representation of n but will not terminate
- (D) It will not print anything and will not terminate



Solution



Question GATE-2020

Consider the following C functions.

```
int fun1(int n) {  
    static int i = 0;  
    if (n > 0) {  
        ++i;  
        fun1(n-1);  
    }  
    return(i);  
}
```

```
int fun2(int n) {  
    static int i = 0;  
    if (n > 0) {  
        i = i + fun1(n);  
        fun2(n-1);  
    }  
    return(i);  
}
```

The return value of fun2(5) is 55.

Solution

$$\begin{array}{r} i = 0 \\ \times 5 \\ \hline 25 \\ + 0 \\ \hline 25 \end{array}$$

$$\begin{array}{r} i = 0 \\ \times 3 \\ \hline 0 \\ + 2 \\ \hline 15 \end{array}$$

```
funz(s)
|  
i = i + fun1(s)
funz(u)
```

```
i = i + fun1(1)
funz(0)
return i
```

```
i = i + fun1(u)
funz(3)
return i
```

```
i = i + fun1(3)
funz(2)
return i
```

```
i = i + fun1(2)
funz(1)
return i
```



Solution



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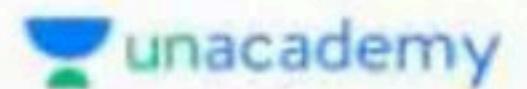
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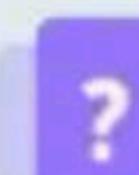
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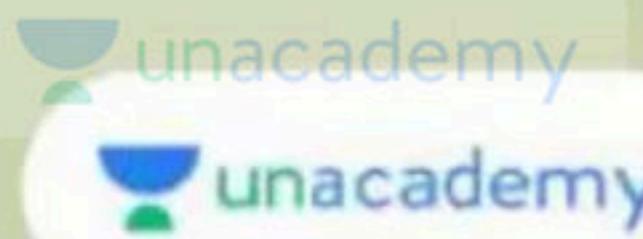
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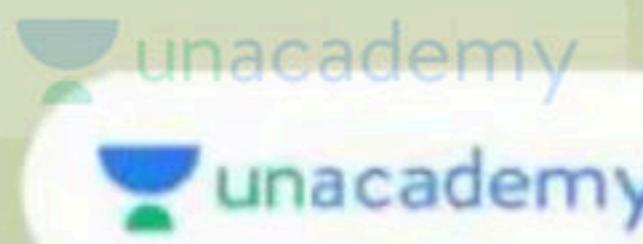
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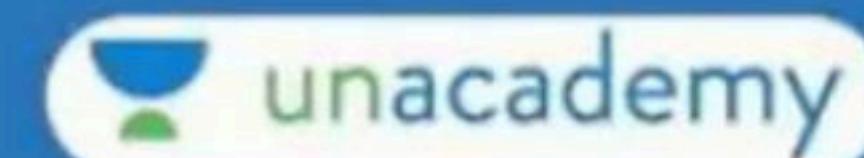
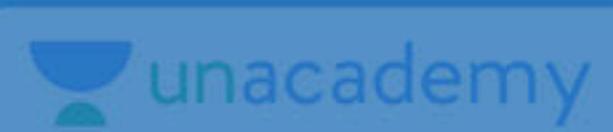


Customised Doubt Solving



Physical Notes**





UNACADEMY SCHOLARSHIP TEST for GATE

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100%
SCHOLARSHIP

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Test Syllabus

GENERAL APTITUDE & ENGINEERING MATHS



Duration: 50 Mins | 25 Questions

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