

29/10/24

Write a code using recursion for factorial, fibonacci, tower of hanoi.

factorial

```
int factorial (int n) {  
    if (n >= 1)  
        return n * factorial (n-1);  
    else  
        return 1;  
}
```

fibonacci (int n)

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

```
Hanoi (int n, char from_rod, char to_rod, char  
if (n <= 1) {  
    printf ("move disk 1 from rod %c to rod %c\n",  
            from_rod, to_rod);  
    return;  
}
```

```
hanoi (n-1, from_rod, aux_rod, to_rod);  
printf ("move disk %d from %c to rod %c\n",  
        n, from_rod, to_rod);  
hanoi (n-1, aux_rod, to_rod, from_rod);  
}
```

```
#include <stdio.h>
```

```
#include <stdlib.h>
```

```
long factorial (int n);
```

```
long fibonacci (int n);
```

```
void hanoi (int n, char from_rod, char to_rod, char aux_rod)
```

```
int main() {
```

```
    int n, i;
```

```
    char ch;
```

```
    while (1) {
```

```
        printf ("1: factorial 1n 2: fib 1n3: Toh 1n4: exit 1n");
```

```
        printf ("1n enter you choice ");
```

```
        scanf ("%c", &ch);
```

```
        switch (ch) {
```

```
            case '1':
```

```
                printf ("enter number for factorial: ");
```

```
                scanf ("%d", &n);
```

```
                printf ("factorial of %d = %d 1n", n, factorial(n));
```

```
                break;
```

```
            case '2':
```

```
                printf ("enter the number of terms: ");
```

```
                scanf ("%d", &n);
```

```
                printf ("fibonacci series: ");
```

```
                for (i=0; i<n; i++) {
```

```
                    printf ("%d", fibonacci(i));
```

```
                }
```

```
                printf ("1n");
```

```
                break;
```

```
            case '3':
```

```
                printf ("Enter number of disks: ");
```

```
                scanf ("%d", &n);
```

```
                hanoi (n, 'A', 'B', 'C');
```

```
            case '4': exit(0);
```

```
        break;
```



```

default:
printf ("wrong input\n");
}
}
}
long factorial (int n) {
    if (n >= 1)
        return n * factorial (n-1);
    else
        return n * 1;
}
int fibonacci (int n) {
    if (n <= 1)
        return n;
    else
        return (fibonacci (n-1) + fibonacci (n-2));
}
void hanoi (int n, char from_rod, char to_rod,
            char aux_rod) {
    if (n == 1) {
        printf ("move disk 1 from rod %c to %c\n",
                from_rod, to_rod);
        return;
    }
    hanoi (n-1, from_rod, aux_rod, to_rod);
    printf ("move disk %d from rod %c to rod %c\n",
            n, from_rod, to_rod);
    hanoi (n-1, aux_rod, to_rod, from_rod);
}

```

- 1: Factorial
- 2: Fibonacci
- 3: Tower of hanoi
- 4: exit

1:

enter number for factorial 10
factorial of 10 is 362880

2:


enter the number of terms 4
Fibonacci series : 0 1 1 2

3:

enter the number of disk 3

move disk 1 from rod A to Rod C
move disk 2 from rod A to Rod B
move disk 1 from rod C to Rod B
move disk 3 from rod A to Rod C
move disk 1 from rod B to Rod A
move disk 2 from rod B to Rod C
move disk 1 from rod A to Rod C.

4:

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