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1. Recursion and stack:

Task 1:

```
<!DOCTYPE html>
<html lang="en">
<head>
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-scale=1.0">
   <title>JavaScript</title>
</head>
<body>
   <script>
     function factorial(num){
      if(num<=0){
       return 1;
       }
       else{
       return num*factorial(num-1)
       }
      }
     console.log(factorial(5));
   </script>
</body>
</html>
```

```
    120

 >
```

Task 2:

```
<!DOCTYPE html>
<html lang="en">
<head>
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-scale=1.0">
   <title>JavaScript</title>
</head>
<body>
   <script>
     function fib(num){
      if(num==0){
       return 0;
       }else if(num==1){
       return 1;
       }else
       return fib(num-1) + fib(num-2);
      }
     console.log(fib(15));
   </script>
```

```
</body>
</html>
    610
> |
```

Task 3:

```html
<!DOCTYPE html>
<html lang="en">
<head>
 <meta charset="UTF-8">
 <meta name="viewport" content="width=device-width, initial-scale=1.0">
 <title>JavaScript</title>
</head>
<body>
 <script>
   function count(num) {
    if(num<0){
     return 0;
    }else if (num == 0 || num == 1) {
     return 1;
    } else if (num == 2) {
     return 2;
    } else {
     return count(num - 1) + count(num - 2) + count(num - 3);
    }
   }
   console.log(count(5));
 </script>
</body>
</html>
    13
>
```

Task 4:

```html
<!DOCTYPE html>
<html lang="en">
<head>
   <meta charset="UTF-8">
   <meta name="viewport" content="width=device-width, initial-scale=1.0">
   <title>Document</title>
</head>
<body>
   <script>
     function flattenArray(arr) {
        let result = [];
        for (let i = 0; i < arr.length; i++) {
           if (Array.isArray(arr[i])) {
               result = result.concat(flattenArray(arr[i]));
           } else {
```
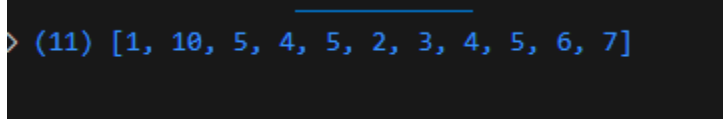
```
                result.push(arr[i]);
            }
        }
        return result;
    }
    console.log(flattenArray([1,[[10,5],[4,5]], [2, 3], [4, [5, 6]], 7]));
  </script>
</body>
```

```
> (11) [1, 10, 5, 4, 5, 2, 3, 4, 5, 6, 7]
```

Task 5:

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Document</title>
</head>
<body>
    <script>
        var c = 0;
        function towerofhanoi(n,start,center,end){
            if(n==0){
                return;
            }
            towerofhanoi(n-1,start,center,end);
            c++;
            towerofhanoi(n-1,center,end,start)
        }
        n = 4
        towerofhanoi(n,'A','B','C')
        console.log(c);
    </script>
</body>
```
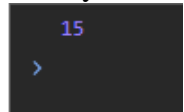
```
    15
>
```

2. JSON and variable length arguments/spread syntax:

Task 6:

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Document</title>
</head>
<body>
```
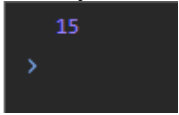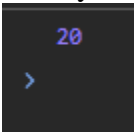
```
<script>
  let sum = (...arr)=>{
      return arr.reduce((a,b)=>a+b,0);
  }
  console.log(sum(1,2,3,4,5))
</script>
</body>
```

```
15
>
```

Task 7:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Document</title>
</head>
<body>
  <script>
    let sum = (...arr)=>{
        return arr.reduce((a,b)=>a+b,0);
    }
    arr = [2,3,4,5,6]
    console.log(sum(...arr))
  </script>
</body>
```

```
20
>
```

Task 8:

```
<!DOCTYPE html>
<html lang="en">
<head>
  <meta charset="UTF-8">
  <meta name="viewport" content="width=device-width, initial-scale=1.0">
  <title>Document</title>
</head>
<body>
  <script>
    let sum = {a:2,b:3,c:4}
    document.write(JSON.stringify(sum));
  </script>
</body>
```

```
{"a":2,"b":3,"c":4}
```

Task 9:

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Document</title>
</head>
<body>
    <script>
      let sum = {a:2,b:3,c:4}
      let count = {c:8,d:9}
      let newObj = {...sum,...count}
      document.write(JSON.stringify(newObj));
    </script>
</body>
```
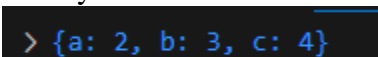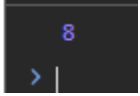
```
{"a":2,"b":3,"c":8,"d":9}
```

Task 10:

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Document</title>
</head>
<body>
    <script>
      let sum = {a:2,b:3,c:4}
      let newOb = JSON.stringify(sum)
      console.log(JSON.parse(newOb));
    </script>
</body>
```

```
> {a: 2, b: 3, c: 4}
```

3.Closure

Task 11:

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Document</title>
</head>
<body>
    <script>
      function out(a){
```

```
      return (b)=>a+b
      }
    let outer = out(5)
    console.log(outer(3));
  </script>
</body>
```

```
    8
> |
```

Task 12:
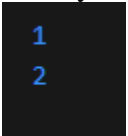
```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Document</title>
</head>
<body>
    <script>
     function counter(){
     let c = 0;
     return ()=>++c
     }
     c1 = counter();
     console.log(c1())
     console.log(c1())
    </script>
</body>
```

```
   1
   2
```

Task 13:

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Document</title>
</head>
<body>
    <script>
     function counter(){
     let c = 0;
     return ()=>++c
     }
     c1 = counter();
     console.log(c1())
     console.log(c1())
     c2 = counter();
```
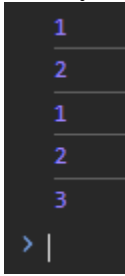
```
        console.log(c2())
        console.log(c2())
        console.log(c2())
    </script>
</body>
```

```
    1
    2
    1
    2
    3
>  |
```

Task 14:

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Document</title>
</head>
<body>
    <script>
      function counter(){
      let c = 0;
      return ()=>++c
      }
      c1 = counter();
        console.log(c1())
        console.log(c1())
    </script>
</body>
```

```
    1
    2
```

Task 15:

```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <title>Document</title>
</head>
<body>
    <script>
      function cal(val){
      if(val === "add")
      return (a,b)=>a+b;
      else if(val === "sub")
      return (a,b)=>a-b;
```
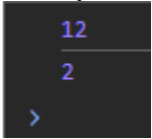
```
    }
    c1 = cal("add");
    c2 = cal("sub");
    console.log(c1(5,7))
    console.log(c2(7,5))
  </script>
</body>
```

```
    12
    2
>
```