**Assignment9**

**1.**

function isPowerOfTwo(n) {

if (n <= 0) {

return false;

}

return (n & (n - 1)) === 0;

}

**Test cases**

console.log(isPowerOfTwo(1));

**Output:** true

console.log(isPowerOfTwo(16));

**Output:** true

console.log(isPowerOfTwo(3));

**Output:** false

**2.**

function sumOfFirstNNumbers(n) {

return (n \* (n + 1)) / 2;

}

**Test cases**

console.log(sumOfFirstNNumbers(3));

**Output:** 6

console.log(sumOfFirstNNumbers(5));

**Output:** 15

**3.**

function factorial(N) {

let result = 1;

for (let i = 1; i <= N; i++) {

result \*= i;

}

return result;

}

**Test cases**

console.log(factorialRecursive(5));

**Output:** 120

console.log(factorialRecursive(4));

**Output:** 24

**4.**

function exponentiation(N, P) {

return Math.pow(N, P);

}

**Test cases**

console.log(exponentiation(5, 2));

**Output:** 25

console.log(exponentiation(2, 5));

**Output:** 32

**5.**

function findMax(arr, start, end) {

if (start === end) {

return arr[start];

}

const mid = Math.floor((start + end) / 2);

const maxLeft = findMax(arr, start, mid);

const maxRight = findMax(arr, mid + 1, end);

return Math.max(maxLeft, maxRight);

}

**Test case**

const arr = [1, 4, 3, -5, -4, 8, 6];

console.log(findMax(arr, 0, arr.length - 1));

**Output:** 8

**6.**

function findNthTerm(a, d, N) {

return a + (N - 1) \* d;

}

**Test case**

const a = 2;

const d = 1;

const N = 5;

console.log(findNthTerm(a, d, N));

**Output:** 6

**7.**

function permutations(s) {

const result = [];

generatePermutations([...s], 0, s.length - 1, result);

return result;

}

function generatePermutations(s, left, right, result) {

if (left === right) {

result.push(s.join(''));

} else {

for (let i = left; i <= right; i++) {

[s[left], s[i]] = [s[i], s[left]]; // Swap characters

generatePermutations(s, left + 1, right, result);

[s[left], s[i]] = [s[i], s[left]]; // Restoring original

}

}

}

**Test case**

const S = "ABC";

console.log(permutations(S));

**output:** ["ABC", "ACB", "BAC", "BCA", "CBA", "CAB"]

**8.**

function productOfArray(arr) {

let product = 1;

for (let i = 0; i < arr.length; i++) {

product \*= arr[i];

}

return product;

}

**Test case**

const arr1 = [1, 2, 3, 4, 5];

console.log(productOfArray(arr1));

**Output:** 120

const arr2 = [1, 6, 3];

console.log(productOfArray(arr2));

**Output:** 18