**Lab Cycle 2**

**Style:**

**body**

**{**

**background-color: skyblue;**

**text-align: center;**

**font-family: Calibri;**

**}**

**input**

**{**

**width: 25%;**

**padding: 10px;**

**padding-right: 10px;**

**margin-top: 5px;**

**margin-bottom: 15px;**

**border: 3px solid gray;**

**border-radius: 4px;**

**box-sizing: border-box;**

**font-size: 16px;**

**}**

**input[type="submit"],input[type="reset"], button**

**{**

**background-color: #4CAF50;**

**color: #fff;**

**padding-left: 10px;**

**padding-right: 10px;**

**border: none;**

**border-radius: 4px;**

**cursor: pointer;**

**font-size: 16px;**

**margin-top: 10px;**

**margin-bottom: 15px;**

**width: 10%;**

**}**

**input[type="submit"]:hover, input[type="reset"]:hover, button:hover**

**{**

**background-color: #45a049;**

**}**

**div**

**{**

**margin-top: 50px;**

**margin-bottom: 50px;**

**}**

**.output**

**{**

**border:3px solid black;**

**width:max-content;**

**padding-right:20px;**

**padding-left:20px;**

**}**

**span**

**{**

**font-size: 25px;**

**font-weight:bold;**

**}**

**img**

**{**

**width: 45%;**

**border: 3px solid black;**

**}**

**1a. Write a java script code to find the given year is leap year or not.**

**Program:**

**<html>**

**<head>**

**<title>Leap Year Calculator</title>**

**<link rel="stylesheet" type="text/css" href="style.css">**

**<script>**

**function isLeapYear(year)**

**{**

**if (year % 4 == 0 && year % 100 != 0 || year % 400 == 0)**

**return true;**

**else**

**return false;**

**}**

**function getYear()**

**{**

**let year = parseInt(document.getElementById("year").value);**

**let answer = '';**

**if(year>0 && year<=9999)**

**{**

**if(isLeapYear(year))**

**answer = year + " is a Leap Year";**

**else**

**answer = year + " is not a Leap Year";**

**}**

**else**

**answer = "Invalid Year!";**

**document.getElementById("output").innerHTML = answer;**

**}**

**</script>**

**</head>**

**<body>**

**<div>**

**<span>Enter a year:</span>**

**<input type="number" id="year"><br>**

**<input type="submit" value="SUBMIT" onclick="getYear();"><br>**

**<center>**

**<div class="output">**

**<h1 id="output"></h1>**

**</div>**

**</center>**

**</div>**

**</body>**

**</html>**

**1b. Write a java script code to compute the biggest of three numbers.**

**Program:**

**<html>**

**<head>**

**<title>Largest Among Three Numbers</title>**

**<link rel="stylesheet" type="text/css" href="style.css">**

**<script>**

**function largestAmongThree(a, b, c)**

**{**

**let max = a;**

**if(b > max)**

**max = b;**

**if(c > max)**

**max = c;**

**return max;**

**}**

**function getNum()**

**{**

**let n1 = parseFloat(document.getElementById("num1").value);**

**let n2 = parseFloat(document.getElementById("num2").value);**

**let n3 = parseFloat(document.getElementById("num3").value);**

**let answer = '';**

**if(Math.floor(n1%1) <= 0 && Math.floor(n2%1) <= 0 && Math.floor(n3%1) <= 0)**

**answer = "Largest Number Among "+n1+", "+n2+", "+n3+" = "+largestAmongThree(n1,n2,n3);**

**else**

**answer = "Invalid Number!";**

**document.getElementById("output").innerHTML = answer;**

**}**

**</script>**

**</head>**

**<body>**

**<div>**

**<span>Enter number 1:</span>**

**<input type="number" id="num1"><br>**

**<span>Enter number 2:</span>**

**<input type="number" id="num2"><br>**

**<span>Enter number 3:</span>**

**<input type="number" id="num3"><br>**

**<input type="submit" value="SUBMIT" onclick="getNum();">**

**<center>**

**<div class="output">**

**<h1 id="output"></h1>**

**</div>**

**</center>**

**</div>**

**</body>**

**</html>**

**1c. Write a java script code to perform the arithmetic operations using switch statement.**

**Program:**

**<html>**

**<head>**

**<title>Simple Calculator</title>**

**<link rel="stylesheet" type="text/css" href="style.css">**

**<script>**

**function calculate(n1, oper, n2)**

**{**

**switch(oper)**

**{**

**case '+':**

**return n1 + n2;**

**case '-':**

**return n1 - n2;**

**case '\*':**

**return n1 \* n2;**

**case '/':**

**return n1 / n2;**

**case '//':**

**return Math.floor(n1/n2);**

**case '%':**

**return n1 % n2;**

**case '\*\*':**

**return n1 \*\* n2;**

**default:**

**return "Invalid Operator!";**

**}**

**}**

**function getData()**

**{**

**let n1 = parseFloat(document.getElementById("num1").value);**

**let oper = document.getElementById("oper").value;**

**let n2 = parseFloat(document.getElementById("num2").value);**

**let answer = '';**

**if(Math.floor(n1%1) <= 0 && Math.floor(n2%1) <= 0)**

**{**

**answer = calculate(n1, oper, n2);**

**if(answer != "Invalid Operator!")**

**answer = "The Expression: " + n1 + " " + oper + " " + n2 + " = " + answer;**

**}**

**else answer = "Invalid Number!";**

**document.getElementById("output").innerHTML = answer;**

**}**

**</script>**

**</head>**

**<body>**

**<div>**

**<span>Enter 1st Operand:</span>**

**<input type="number" id="num1"><br>**

**<span>Enter Operator:</span>**

**<input type="text" id="oper"><br>**

**<span>Enter 2nd Operand:</span>**

**<input type="number" id="num2"><br>**

**<input type="submit" value="SUBMIT" onclick="getData();">**

**<center>**

**<div class="output">**

**<h1 id="output"></h1>**

**</div>**

**</center>**

**</div>**

**</body>**

**</html>**

**2a. Write a java script code to calculate the sum of the digits of a give number.**

**Program:**

**<html>**

**<head>**

**<title>Sum Of Digits of a Number</title>**

**<link rel="stylesheet" type="text/css" href="style.css">**

**<script>**

**function sumOfDigits(number)**

**{**

**let sum = 0;**

**let rem = 0;**

**if(number < 0)**

**{**

**number \*= -1;**

**}**

**while(number>0)**

**{**

**rem = number % 10;**

**sum += rem;**

**number = Math.floor(number/10);**

**}**

**return sum;}**

**function getNum()**

**{**

**let number = parseInt(document.getElementById("num").value);**

**let answer = '';**

**if(Number.isInteger(number))**

**answer = "Sum of Digits of " + number + " = " + sumOfDigits(number);**

**else answer = "Invalid Number!"**

**document.getElementById("output").innerHTML = answer;**

**}**

**</script>**

**</head>**

**<body>**

**<div>**

**<span>Enter a number:</span>**

**<input type="number" id="num"><br>**

**<input type="submit" value="SUBMIT" onclick="getNum();">**

**<center>**

**<div class="output"><h1 id="output"></h1></div>**

**</center>**

**</div>**

**</body></html>**

**2b. Write a java script code to reverse a given number.**

**Program:**

**<html>**

**<head>**

**<title>Reverse of a Number</title>**

**<link rel="stylesheet" type="text/css" href="style.css">**

**<script>**

**function reverseNum(number)**

**{**

**let rev = '';**

**let rem = 0;**

**if(number < 0)**

**number \*= -1;**

**while(number>0)**

**{**

**rem = number%10;**

**rev += rem;**

**number = Math.floor(number/10);**

**}**

**return rev;**

**}**

**function getNum()**

**{**

**let number = parseInt(document.getElementById("num").value);**

**let answer = '';**

**if(Number.isInteger(number))**

**answer = "Reverse of " + number + " = " + reverseNum(number);**

**else**

**answer = "Invalid Number!";**

**document.getElementById("output").innerHTML = answer;**

**}**

**</script>**

**</head>**

**<body>**

**<div>**

**<span>Enter a number:</span>**

**<input type="number" id="num"><br>**

**<input type="submit" value="SUBIMT" onclick="getNum();">**

**<center><div class="output"><h1 id="output"></h1></div>**

**</center>**

**</div>**

**</body></html>**

**2c. Write a java script code to print the first 10 natural numbers except 5.**

**Program:**

**<html>**

**<head>**

**<title>1 to 10 Numbers Except 5</title>**

**<link rel="stylesheet" type="text/css" href="style.css">**

**<script>**

**function printNums()**

**{**

**for(let num=1; num<=10; num++)**

**{**

**if(num === 5)**

**continue;**

**document.getElementById("output").innerHTML += " " + num;**

**}**

**}**

**</script>**

**</head>**

**<body>**

**<div>**

**<input type="submit" value="Print Numbers" onclick="printNums();">**

**<center>**

**<div class="output">**

**<h1 id="output"></h1>**

**</div>**

**</center>**

**</div>**

**</body>**

**</html>**

**3a. Write functions in java script for GCD, Reversing a Number, Random Numbers.**

**Program:**

**<html>**

**<head>**

**<title>GCD, Reverse Number, Random Number</title>**

**<link rel="stylesheet" type="text/css" href="style.css">**

**<script>**

**function GCD(a, b)**

**{**

**if (b === 0)**

**return Math.abs(a);**

**else**

**return Math.abs(GCD(b, a%b));**

**}**

**function reverseNum(number)**

**{**

**let rev = '';**

**let rem = 0;**

**if(number < 0)**

**number \*= -1;**

**while(number>0)**

**{**

**rem = number%10;**

**rev += rem;**

**number = Math.floor(number/10);**

**}**

**return rev;**

**}**

**function genRandNum(min ,max)**

**{**

**return Math.floor(Math.random()\*(max - min) + min);**

**}**

**function getGcdNum()**

**{**

**let num1 = parseInt(document.getElementById("gcdNum1").value);**

**let num2 = parseInt(document.getElementById("gcdNum2").value);**

**let answer = '';**

**if(Number.isInteger(num1) && Number.isInteger(num2))**

**answer = "GCD of " + num1 + " and " + num2 + " = " + GCD(num1, num2);**

**else**

**answer = "Invalid Number!";**

**document.getElementById("GcdOutput").innerHTML = answer;**

**}**

**function getRevNum()**

**{**

**let number = parseInt(document.getElementById("revNum").value);**

**let answer = '';**

**if(Number.isInteger(number))**

**answer = "Reverse of " + number + " = " + reverseNum(number);**

**else**

**answer = "Invalid Number!";**

**document.getElementById("ReverseOutput").innerHTML = answer;**

**}**

**function getRandRange()**

**{**

**let min = parseInt(document.getElementById("min").value);**

**let max = parseInt(document.getElementById("max").value);**

**let answer = '';**

**if(Number.isInteger(min) && Number.isInteger(min))**

**{**

**if(min < max-1)**

**answer = "A Random Number in the range (" + min + ", " + max + "): " + genRandNum(min, max);**

**else**

**answer = "min should be less than max!"**

**}**

**else**

**answer = "Invalid Number!";**

**document.getElementById("RandomOutput").innerHTML = answer;**

**}**

**</script>**

**</head>**

**<body>**

**<div>**

**<span><u>GCD:</u></span><br>**

**<span>Enter number 1:</span>**

**<input type="number" id="gcdNum1"><br>**

**<span>Enter number 2:</span>**

**<input type="number" id="gcdNum2"><br>**

**<input type="submit" value="SUBMIT" onclick="getGcdNum();"><br>**

**<center>**

**<div class="output">**

**<h1 id="GcdOutput"></h1>**

**</div>**

**</center>**

**</div>**

**<div>**

**<span><u>Reverse Number:</u></span><br>**

**<span>Enter the number:</span>**

**<input type="number" id="revNum"><br>**

**<input type="submit" value="SUBMIT" onclick="getRevNum();"><br>**

**<center>**

**<div class="output">**

**<h1 id="ReverseOutput"></h1>**

**</div>**

**</center>**

**</div>**

**<div>**

**<span><u>Random Number:</u></span><br>**

**<span>Enter the range(max exclusive):</span><br>**

**<input type="number" id="min" placeholder="min">**

**<span>to</span>**

**<input type="number" id="max" placeholder="max"><br>**

**<input type="submit" value="SUBMIT" onclick="getRandRange()">**

**<center>**

**<div class="output">**

**<h1 id="RandomOutput"></h1>**

**</div>**

**</center>**

**</div>**

**</body>**

**</html>**

**3b. Write Recursive functions in java script for Factorial, Fibonacci, Power.**

**Program:**

**<html>**

**<head>**

**<title>Recursive Functions</title>**

**<link rel="stylesheet" type="text/css" href="style.css">**

**<script>**

**function Factorial(number)**

**{**

**if(number <= 1)**

**return 1;**

**return number \* Factorial(number-1);**

**}**

**function Fibonacci(number)**

**{**

**if(number === 1)**

**return 0;**

**if(number === 2 || number === 3)**

**return 1;**

**return Fibonacci(number-1) + Fibonacci(number-2);**

**}**

**function Power(base, power)**

**{**

**if(power === 0)**

**return 1;**

**if(power === 1)**

**return base;**

**if(power < 0)**

**return 1/Power(base, -power);**

**if(base<0 && power%2 == 0)**

**return Power(-base, power);**

**if(base<0 && power%2 == 1)**

**return -Power(-base, power);**

**if(power%1 !== 0)**

**return base \*\* power**

**return base \* Power(base, power-1)**

**}**

**function getFactNum()**

**{**

**let num = parseInt(document.getElementById("FactNum").value);**

**let answer = '';**

**if(Number.isInteger(num))**

**{**

**if(num >= 0)**

**answer = "Factorial of " + num + " = " + Factorial(num);**

**else**

**answer = "Factorial of " + num + " = Undefined";**

**}**

**else**

**answer = "Invalid Number!";**

**document.getElementById("FactOutput").innerHTML = answer;**

**}**

**function getFibCount()**

**{**

**let count = parseInt(document.getElementById("FibCount").value);**

**let answer = '';**

**if(Number.isInteger(count))**

**{**

**if(count > 0)**

**{**

**if(count > 40)**

**answer = "Stack Overflow!<br>Cannot print " + count + " Fibonacci Numbers";**

**else**

**{**

**let i;**

**answer = "The First " + count + " Fibonacci Numbers are:<br>";**

**for(i=1; i<count; i++)**

**answer += Fibonacci(i) + ", ";**

**answer += Fibonacci(i);**

**}**

**}**

**else**

**answer = "Invalid Count!";**

**}**

**else**

**answer = "Invalid Number!";**

**document.getElementById("FibOutput").innerHTML = answer;**

**}**

**function getBaseExp()**

**{**

**let base = parseFloat(document.getElementById("BaseNum").value);**

**let exp = parseFloat(document.getElementById("ExpNum").value);**

**let answer = "The Expression: " + base + " \*\* " + exp + " = ";**

**if(Math.floor(base%1) <= 0 && Math.floor(exp%1) <= 0)**

**{**

**if(base < 0 && exp%1 !== 0)**

**answer += "Complex Number";**

**else**

**answer += Power(base, exp);**

**}**

**else**

**answer = "Invalid Number!";**

**document.getElementById("PowerOutput").innerHTML = answer;**

**}**

**</script>**

**</head>**

**<body>**

**<div>**

**<span><u>Factorial:</u><br>**

**Enter a number:</span>**

**<input type="number" id="FactNum"><br>**

**<input type="submit" value="SUBMIT" onclick="getFactNum();"><br>**

**<center>**

**<div class="output">**

**<h1 id="FactOutput"></h1>**

**</div>**

**</center>**

**</div>**

**<div>**

**<span><u>Fibonacci Numbers:</u><br>**

**Enter the count:</span>**

**<input type="number" id="FibCount"><br>**

**<input type="submit" value="SUBMIT" onclick="getFibCount();"><br>**

**<center>**

**<div class="output">**

**<h1 id="FibOutput"></h1>**

**</div>**

**</center>**

**</div>**

**<div>**

**<span><u>Power:</u><br>**

**Enter the Base:</span>**

**<input type="number" id="BaseNum"><br>**

**<span>Enter the Power:</span>**

**<input type="number" id="ExpNum"><br>**

**<input type="submit" value="SUBMIT" onclick="getBaseExp()">**

**<center>**

**<div class="output">**

**<h1 id="PowerOutput"></h1>**

**</div>**

**</center>**

**</div>**

**</body>**

**</html>**

**3c. Write a java script code for Random image generator.**

**Program:**

**<html>**

**<head>**

**<title>Random Image Generator</title>**

**<link rel="stylesheet" type="text/css" href="style.css">**

**<script>**

**let CarImg = new Array(10);**

**CarImg[0] = "img1.jpg";**

**CarImg[1] = "img2.jpg";**

**CarImg[2] = "img3.jpg";**

**CarImg[3] = "img4.jpg";**

**CarImg[4] = "img5.jpg";**

**CarImg[5] = "img6.jpg";**

**CarImg[6] = "img7.jpg";**

**CarImg[7] = "img8.jpg";**

**CarImg[8] = "img9.jpg";**

**function genImg()**

**{**

**let number = Math.floor(Math.random()\*(CarImg.length - 1));**

**document.getElementById("ImgOutput").innerHTML = '<img src="'+CarImg[number]+'" alt="Car Image '+number+'">';**

**}**

**</script>**

**</head>**

**<body>**

**<div>**

**<h1><u>Random Car Images</u></h1>**

**<input type="submit" value="Generate Image" onclick="genImg();">**

**<center id="ImgOutput"></center>**

**</div>**

**</body>**

**</html>**

**4a. Write a java script code to sort the array element using bubble sort technique.**

**Program:**

**<html>**

**<head>**

**<title>Bubble Sort</title>**

**<link rel="stylesheet" type="text/css" href="style.css">**

**<script>**

**let arr = new Array(3,2,1,5,4,6,8,9,7);**

**function bubbleSort(arr)**

**{**

**for(var i=0; i<arr.length; i++)**

**{**

**let flag = false;**

**for(var j=0; j<arr.length-i-1; j++)**

**{**

**if(arr[j]>arr[j+1])**

**{**

**[arr[j], arr[j+1]] = [arr[j+1], arr[j]];**

**flag = true;**

**}**

**}**

**if(flag === false) break;**

**}**

**document.getElementById("SortedArrayOutput").innerHTML = "Elements After Sorting:<br>["+arr+"]<br>";**

**}**

**function getArray()**

**{**

**document.getElementById("UnsortedArrayOutput").innerHTML = "Elements Before Sorting:<br>["+arr+"]<br>";**

**}**

**</script>**

**</head>**

**<body>**

**<h1><u>Bubble Sort</u></h1>**

**<input type="submit" value="Show Elements" onclick="getArray();"><br>**

**<span id="UnsortedArrayOutput"></span><br>**

**<input type="submit" value="Sort Elements" onclick = "bubbleSort(arr); ">**

**<br>**

**<span id="SortedArrayOutput"></span><br>**

**</body>**

**</html>**

**4b. Write a java script code to search an element in the given set of elements using binary search technique.**

**Program:**

**<html>**

**<head>**

**<title>Binary Search</title>**

**<link rel="stylesheet" type="text/css" href="style.css">**

**<script>**

**let arr = new Array(1,2,3,4,5,6,7,8,9);**

**function binarySearch(arr, ele)**

**{**

**let low = 0;**

**let high = arr.length - 1;**

**let mid;**

**while(low <= high)**

**{**

**mid = Math.floor((low+high)/2);**

**if(ele === arr[mid])**

**return true;**

**else if(ele < arr[mid])**

**high = mid - 1;**

**else**

**low = mid + 1;**

**}**

**return false;**

**}**

**function getArray()**

**{**

**document.getElementById("ArrayOutput").innerHTML = "The Sorted Elements are:<br>["+arr+"]<br>";**

**}**

**function getElement()**

**{**

**let ele = parseInt(document.getElementById("element").value);**

**if(binarySearch(arr, ele))**

**document.getElementById("ElementOutput").innerHTML = "Element Found!";**

**else**

**document.getElementById("ElementOutput").innerHTML = "Element Not Found!";**

**}**

**</script>**

**</head>**

**<body>**

**<h1><u>Binary Search</u></h1>**

**<input type="submit" value="Show Elements" onclick="getArray();"><br>**

**<span id="ArrayOutput"></span><br>**

**<span>Enter the element to search:</span>**

**<input type="number" id="element"><br>**

**<input type="submit" value="Search Element" onclick="getElement();">**

**<br>**

**<span id="ElementOutput"></span><br>**

**</body>**

**</html>**

**4c. Write a java script code to perform:**

1. **addition of two matrices.**
2. **multiplication of two matrices.**

**Program:**

**5a. Write a java script code to implement string operations using String object.**

**Program:**

**5b. Write a java script code to implement mathematical operations using Math object.**

**Program:**

**5c. Write a java script code to display greeting messages using Date object.**

**Program:**