Name: T.Tayyab
Regd. no: Y21CS172

Lab Cycle 2

Style:

```
body
{
        background-color: skyblue;
        text-align: center;
        font-family: Calibri;
}
input
{
        width: 25%;
        padding: 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: 10px;
        border: none;
        border-radius: 4px;
        box-sizing: border-box;
        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;
        box-sizing: border-box;
}
```

```
.output
{
        border:3px solid black;
        width:max-content;
        padding-right:20px;
        padding-left:20px;
        box-sizing: border-box;
}
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:

i) addition of two matrices.
ii) multiplication of two matrices.

Program:

```
<html>
  <head>
    <title>Matrix Addition and Multiplication</title>
    <link rel="stylesheet" type="text/css" href="style.css">
    <style>
      .Matrix
      {
        border: 3px solid black;
        padding: 10px;
        width: max-content;
      }
      button, div, table
      {
        margin-top: 10px;
        margin-bottom: 10px;
      }
```

```
  td
  {
     text-align: center;
     width: 35px;
     height: 35px;
  }
</style>
<script>
   const mat1 = [[1,2,3],
                 [4,5,6],
                 [7,8,9]];
   const mat2 = [[10,11,12],
                 [13,14,15],
                 [16,17,18]]
   function showMatrices()
   {
      let output1 = print(mat1);
      let output2 = print(mat2);
      document.getElementById("Matrix1").innerHTML = output1;
      document.getElementById("Matrix2").innerHTML = output2;
   }
```

```
function print(mat)
{
   let output = "";
   for (let i=0; i<mat.length; i++)
   {
      output += "<tr>";
      for (let j=0; j<mat[i].length; j++)
         output += "<td>"+mat[i][j]+"</td>";
      output += "</tr>";
   }
   return output;
}
function add()
{
   let mat3 = [];
   for(let i=0; i<mat1.length; i++)
   {
      let temp = []
      for(let  j =0; j < mat1[i].length; j++)
         temp.push(mat1[i][j]+mat2[i][j]);
      mat3.push(temp);
   }
```

```
    let output = print(mat3);
    document.getElementById("AdditionOutput").innerHTML = output;
}
function multiply()
{
    let mat3 = [];
    for (let i=0; i<mat1.length; i++)
    {
        let temp = [];
        for (let j=0; j<mat1[i].length; j++)
        {
            let res = 0;
            for (let k = 0; k < mat2.length; ++k)
                res += mat1[i][j] * mat2[j][i]
            temp.push(res)
        }
        mat3.push(temp)
    }
    let output = print(mat3);
   document.getElementById("MultiplicationOutput").innerHTML=output;
}
```

```
    </script>
  </head>
  <body>
    <center>
      <button onclick="showMatrices();">Show Matrices</button><br>
      <span>Matrix 1:</span>
      <table class="Matrix" id="Matrix1"></table>
      <span>Matrix 2:</span>
      <table class="Matrix" id="Matrix2"></table>

      <button onclick="add();">ADD</button><br>
      <span>Matrix 1 + Matrix 2:</span>
      <table class="Matrix" id="AdditionOutput"></table>

      <button onclick="multiply();">MULTIPLY</button><br>
      <span>Matrix 1 * Matrix 2:</span>
      <table class="Matrix" id="MultiplicationOutput"></table>
    </center>
  </body>
</html>
```

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: