Assignment 6: More Javascript Practice

Sejal Dua, Tufts University

02/25/2020

URLs (please open with Chrome)

Problem 1: `https://sejaldua.com/web-programming/hw6/lucky_ball.html`
Problem 2: `https://sejaldua.com/web-programming/hw6/amicable_nums.html`

Problem 1: Quick Pick

Use `Math.random()` to do a "quick pick" for a Mass Lottery "Lucky for Life" game. For the game, you need 5 numbers from 1 to 48. Plus, one Lucky Ball number from 1 to 18. Get the 6 random numbers and store them in an array. Display the numbers using the array and a loop. Sort the numbers in the array. Display again.

Then create a payout calculator for a given drawing as follows:

- Create a form with a button and two text boxes. One text box is for a user to enter 5 numbers separated by spaces plus a second text box for the "Lucky Ball" number.
- When the button is pressed, read the data and compare with your pick (the numbers in the array) and determine the winning payout of your pick. You will need to figure out the best way to parse the data and do the comparison.

Listing 1: HTML and Javascript code for Quick Pick

```
<!DOCTYPE html>
<html>
  <head>
    <link rel="stylesheet" href="main.css">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
  </head>
  <body style="text-align: center;">
  <form id="lottery" style="text-align: left;">

    <h1>Mass Lottery "Lucky For Life"</h1>

    <fieldset>
      <legend><span class="number">1</span> Your numbers</legend>
      <legend>
```

```
        <button type="button" style="max-width: 30%; padding: 8px; margin-right: 10px; font-size: 9px;" onclick="display_lotto_numbers()">Get Lotto Numbers</button>
        <input class="ball" id="orig1" value="" disabled>
        <input class="ball" id="orig2" value="" disabled>
        <input class="ball" id="orig3" value="" disabled>
        <input class="ball" id="orig4" value="" disabled>
        <input class="ball" id="orig5" value="" disabled>
        <input class="ball" id="orig6" value="" disabled>
      </legend>
      <legend>
        <button type="button" style="max-width: 30%; padding: 8px; margin-right: 10px; font-size: 9px;" onclick="display_sorted_numbers()">Sort Lotto Numbers</button>
        <input class="ball" id="sorted1" value="" disabled>
        <input class="ball" id="sorted2" value="" disabled>
        <input class="ball" id="sorted3" value="" disabled>
        <input class="ball" id="sorted4" value="" disabled>
        <input class="ball" id="sorted5" value="" disabled>
        <input class="ball" id="sorted6" value="" disabled>
      </legend>
    </fieldset>

    <fieldset>
      <legend><span class="number">2</span> Your selections</legend>
      <label for="five">5 numbers (separated by spaces):</label>
      <input type="text" id="five">

      <label for="lucky">Lucky ball:</label>
      <input type="text" id="lucky">

      <button type="button" onclick="parse_selections()">View Payout</button>
    </fieldset>

    <fieldset>
      <legend><span class="number">3</span> Your payout</legend>
      <input class="field" id="match" disabled>
      <input class="field" id="probability" disabled>
      <input class="field" id="payout" disabled>
    </fieldset>



  </form>
  <script>
```

```
    var numbers = new Array();
var numbers_length = 6;
var rand_number, upper_limit;
while (numbers.length < numbers_length) {
  upper_limit = (numbers.length == numbers_length - 1) ? 18 : 48;
  rand_number = Math.floor(Math.random() * upper_limit) + 1;
  if(numbers.indexOf(rand_number) === -1) numbers.push(rand_number);
}
function display_lotto_numbers()
{
  console.log(numbers);
  for (i = 0; i < numbers.length; i++) {
    document.getElementById("orig" + (i + 1)).value = numbers[i];
  }
}

var lucky_ball = numbers[5];
var sorted = numbers.slice(0, 5);
sorted.sort(function(a, b){return a-b});
sorted.push(lucky_ball)
function display_sorted_numbers()
{
  for (i = 0; i < sorted.length; i++) {
    document.getElementById("sorted" + (i + 1)).value = sorted[i];
  }

}

function parse_selections()
{
  var string_five = lottery.five.value;
  var string_lucky = lottery.lucky.value;
  var user_nums = string_five.split(" ").map(function(elem) { return parseInt(elem, 10); });
  var score = 0;
  for (i = 0; i < numbers.length - 1; i++) {
    for (j = 0; j < user_nums.length; j++) {
      if (user_nums[j] == numbers[i]) {
        score += 1;
        break;
      }
    }
  }
  if (string_lucky == lucky_ball)
    score += 0.5;
  switch(score)
```

```
      {
        case 0.5:
          console.log("lucky ball");
          document.getElementById("match").value = "Match: 0 + Lucky Ball";
          document.getElementById("probability").value = "Probability: 1 in 32";
          document.getElementById("payout").value = "Payout: $4";
          break;
        case 1.5:
          document.getElementById("match").value = "Match: 1 + Lucky Ball";
          document.getElementById("probability").value = "Probability: 1 in 49";
          document.getElementById("payout").value = "Payout: $6";
          break;
        case 2:
          document.getElementById("match").value = "Match: 2";
          document.getElementById("probability").value = "Probability: 1 in 14";
          document.getElementById("payout").value = "Payout: $3";
          break;
        case 2.5:
          document.getElementById("match").value = "Match: 2 + Lucky Ball";
          document.getElementById("probability").value = "Probability: 1 in 249";
          document.getElementById("payout").value = "Payout: $25";
          break;
        case 3:
          document.getElementById("match").value = "Match: 3";
          document.getElementById("probability").value = "Probability: 1 in 200";
          document.getElementById("payout").value = "Payout: $20";
          break;
        case 3.5:
          document.getElementById("match").value = "Match: 3 + Lucky Ball";
          document.getElementById("probability").value = "Probability: 1 in 3,413";
          document.getElementById("payout").value = "Payout: $150";
          break;
        case 4:
          document.getElementById("match").value = "Match: 4";
          document.getElementById("probability").value = "Probability: 1 in $8,432";
          document.getElementById("payout").value = "Payout: $200";
        break;
      case 4.5:
        document.getElementById("match").value = "Match: 4 + Lucky Ball";
        document.getElementById("probability").value = "Probability: 1 in 143,355";
        document.getElementById("payout").value = "Payout: $5,000";
        break;
      case 5:
        document.getElementById("match").value = "Match: 5";
        document.getElementById("probability").value = "Probability: 1 in 1,813,027";
        document.getElementById("payout").value = "Payout: $25,000 a YEAR for LIFE!";
        break;
      case 5.5:
        document.getElementById("match").value = "Match: 5 + Lucky Ball";
        document.getElementById("probability").value = "Probability: 1 in 30,821,472";
        document.getElementById("payout").value = "Payout: $7,000 a WEEK for LIFE!";
        break;
      default:
        console.log("default");
        document.getElementById("match").value = "Sorry. You did not win a prize.";
        document.getElementById("probability").value = "NOTE: lottery games are based on chance";
        document.getElementById("payout").value = "and should be played for entertainment only";
        break;
    }
  }
```

```
</script>
</body>
</html>
```

Problem 2: Amicable Numbers

A factor is a number that divides evenly into another number. A pair of numbers are called amicable if their factors (excluding themselves) add up to each other.

For example, the numbers 220 and 284 are amicable, because the factors of 220 are [1, 2, 4, 5, 10, 11, 20, 22, 44, 55, 110] and sum to 284,while the factors of 284 are [1, 2, 4, 71, 142] and sum to 220.

Listing 2: HTML and Javascript code for Amicable Numbers

```
<!DOCTYPE html>
<html>
  <head>
    <link rel="stylesheet" href="main.css">
    <link href="https://fonts.googleapis.com/css?family=Quicksand:400&display=swap" rel="stylesheet">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
  </head>
  <body>
  <form id="amicable" style="font-family: ’Quicksand’, sans-serif;">

    <h1 style="margin-bottom: 2px;">Amicable Numbers</h1>
    <p style="margin-right: 5px; margin-left: 5px;">A pair of numbers are called amicable if their factors (excluding themselves) add up to each other.</p>

    <fieldset>
      <label for="num1" style="margin: 5px 5px;">Number 1</label>
      <input type="number" style="width: 50%; margin: 5px; text-align: center; padding: 8px;" id="num1">
      <label for="num2" style="margin: 5px 5px;">Number 2</label>
      <input type="number" style="width: 50%; margin: 5px; text-align: center; padding: 8px;" id="num2">
      <button type="button" style="max-width: 50%; padding: 8px; margin: 5px 0px; text-align: center; font-size: 9px;"onclick="amicable_check()">Submit</button>
    </fieldset>

    <fieldset>
      <legend> Result</legend>
      <input class="field" style="font-size: 12px; margin: 4px 0px; text-align: center;" id="result" disabled>
      <input class="field" style="width: 40%; margin: 4px 0px; font-size: 12px; text-align: center;" id="factors_1" disabled>
      <input class="field" style="width: 5%; margin: 4px 2px; font-size: 12px; padding: 0px; text-align: center;" id="equals_1" disabled>
      <input class="field" style="width: 40%; margin: 4px 0px; font-size: 12px; text-align: center;" id="factors_2" disabled>
      <input class="field" style="width: 40%; margin: 4px 0px; font-size: 
```

```
    12px; text-align: center;" id="sum_1" disabled>
  <input class="field" style="width: 5%; margin: 4px 2px; font-size: 12px; padding: 0px; text-align: center;" id="equals_2" disabled>
  <input class="field" style="width: 40%; margin: 4px 0px; font-size: 12px; text-align: center;" id="sum_2" disabled>
 </fieldset>
</form>
<div id="test_factors1"></div>
<div id="test_factors2"></div>
<script>
```

```
//event handler
function amicable_check()
{
 var num1, num2, factors1, factors2, sum1, sum2;

 /* get factors and sums for num1 */
 num1 = amicable.num1.value;
 factors1 = getFactors(num1);
 sum1 = addFactors(factors1);

 /* get factors and sums for num2 */
 num2 = amicable.num2.value;
 factors2 = getFactors(num2);
 sum2 = addFactors(factors2);
 console.log(num1, num2, sum1, sum2);

 /* check if amicable */
 var equals = ((num1 == sum2) && (num2 == sum1)) ? true : false;
 if (equals)
  document.getElementById("result").value = num1 + " and " + num2 + " are amicable";
 else
  document.getElementById("result").value = num1 + " and " + num2 + " are NOT amicable";

 /* display information to form for the user */
 document.getElementById("factors_1").value = stringFactors(factors1);
 document.getElementById("factors_2").value = stringFactors(factors2);
 document.getElementById("sum_1").value = sum1;
 document.getElementById("sum_2").value = sum2;
 document.getElementById("equals_1").value = equals ? "=" : "!=";
 document.getElementById("equals_2").value = equals ? "=" : "!=";

}

/* function: isFactor
 * parameters: a number and a test number
 * return: boolean value
 * purpose: check if the test number divides evenly into the number (↩
    in other words, it is a factor of the number)
 */
function isFactor(num, test_num)
{
  return num % test_num == 0 ? true : false;
}
var test1, test2, test3;
test1 = isFactor(24, 8);
test2 = isFactor(12, 7);
test3 = isFactor(13, 0);
/* TEST isFactor */
// console.log("isFactor(24, 8): " + test1);
// console.log(isFactor(24, 8) == true ? "WORKS" : "BROKEN");
// console.log("isFactor(12, 7): " + test2);
// console.log(isFactor(12, 7) == false ? "WORKS" : "BROKEN");
// console.log("isFactor(13, 0): " + test3);
// console.log(isFactor(13, 0) == false ? "WORKS" : "BROKEN");


/* function: stringFactors
 * parameters: array of factors
 * return: string
 * purpose: nicely put together an array string to display the factors↩
     of a given number in the HTML
 */
function stringFactors(arr)
{
  var string = "[";
  arr.forEach(function(item, index) {
    if (index < arr.length - 1)
      string += item + ", ";
    else
      string += item
  });
  string += "]";
  return string;
}
var arr1, arr2, arr3;
arr1 = [1, 2, 3, 4, 6, 12];
arr2 = [1, 3, 9, 27];
```

```
arr3 = [1, 2, 4, 71, 142];
/* TEST stringFactors */
// console.log("stringFactors([" + arr1 + "]): " + stringFactors(arr1));
// console.log("stringFactors([" + arr2 + "]): " + stringFactors(arr2));
// console.log("stringFactors([" + arr3 + "]): " + stringFactors(arr3));


/* function: showFactors
 * parameters: array of factors, id representing the div where the inner HTML will be written
 * return: none
 * purpose: display all items of input array somewhere in the HTML
 */
function showFactors(arr, div_id)
{
  arr.forEach(function(item)
  {
    document.getElementById(div_id).innerHTML += item + " ";
  });
}
/* TEST showFactors */
// showFactors(arr1, "test_factors1");
// showFactors(arr2, "test_factors2");


/* function: addFactors
 * parameters: array of factors
 * return: integer sum
 * purpose: sums all the factors
 */
function addFactors(arr)
{
  var sum_factors = 0
  for (i = 0; i < arr.length; i++) {
    sum_factors += arr[i];
  }
  return sum_factors;
}
/* TEST addFactors */
// console.log("addFactors([" + arr1 + "]): " + addFactors(arr1));
// console.log(addFactors(arr1) == 28 ? "WORKS" : "BROKEN");
// console.log("addFactors([" + arr2 + "]): " + addFactors(arr2));
// console.log(addFactors(arr2) == 40 ? "WORKS" : "BROKEN");
// console.log("addFactors([" + arr3 + "]): " + addFactors(arr3));
```

```
    // console.log(addFactors(arr3) == 220 ? "WORKS" : "BROKEN");


    /* function: getFactors
     * parameters: integer
     * return: array of factors
     * purpose: uses helper function isFactor to get all the factors of the given number
     */
    function getFactors(num)
    {
      var arr = new Array();
      for (i = 1; i < num; i++) {
        if (isFactor(num, i))
          arr.push(i);
      }
      return arr
    }
    /* TEST getFactors */
    // console.log("getFactors(28): [" + getFactors(28) + "]");
    // console.log("getFactors(24): [" + getFactors(24) + "]");
    // console.log("getFactors(284): [" + getFactors(284) + "]");
```

```
</script>
</body>
</html>
```

Opinion of Javascript

I am a fan of Javascript. I am a comfortable programmer, so this assignment was very fun for me. My favorite aspect of Javascript as a programming language is how versatile it is. I like that data types get implicitly converted when you want to work with strings and integers for the same task. For example, if I want to print out a string to the console. I can just say `console.log(string1 + num1)`, whereas in Python, I would have to say `print(string1 + str(num1)`.

I also really like the interoperability of Javascript, how it can be embedded within HTML code. It is very neat that it renders properly that way.

Some things that have been confusing me include variable scope and event handlers. I also just find it annoying that variables must be declared `var`.