University of Maryland College Park

Dept of Computer Science

CMSC389N Spring 2017

Midterm II Key

Last Name (PRINT): ____

First Name (PRINT): ____

University Directory ID (e.g., umcpturtle) ________________________________

I pledge on my honor that I have not given or received any unauthorized assistance on this examination.

Your signature: ____

Instructions

- This exam is a closed-book and closed-notes exam.
- Total point value is 200 points.
- The exam is a 75 minutes exam.
- Please use a pencil to complete the exam.
- WRITE NEATLY.
- **You may not use jQuery nor Bootstrap.**
- **You don't need to use meaningful variable names; however, we expect good indentation.**

Grader Use Only

#1	Problem #1 (HTML/CSS/JS Language)	(90)	
#2	Problem #2 (JavaScript Coding/Custom Types)	(50)	
#3	Problem #3 (JavaScript Coding/Dynamic HTML)	(60)	
Total	Total	(200)	

Problem #1 (HTML/CSS/JS Language)

1. (3 pts) In JavaScript which value is associated with object properties that do not exist?

   a. undefined
   b. null
   c. 0
   d. None of the above.

   Answer: a.

2. (3 pts) Which of the following expressions are true in JavaScript?

   a. **NaN == NaN**
   b. **NaN === NaN**
   c. true
   d. None of the above.

   Answer: c

3. (3 pts) Which of the following expressions are true in JavaScript? Circle all the ones that are true.

   a. new Object(false)
   b. new Object(true)
   c. "20" === 20
   d. None of the above.

   Answer: a, b

4. (3 pts) What is the output of the following program (notice it relies on let)?

```
let x = 25;

if (x > 5) {
   let x = 100;
   document.writeln("First: " + x + "<br>");
}
document.writeln("Second: " + x + "<br>")
```

Answer:
First: 100
Second: 25

5. (3 pts) What is the output of the following program (notice it relies on var)?

```
var x = 25;

if (x > 5) {
   var x = 100;
   document.writeln("First: " + x + "<br>");
 }
document.writeln("Second: " + x + "<br>")
```

Answer:

First: 100
Second: 100

6. (3 pts) Which of the following allow us to retrieve the character associated with an index position in a string? Circle all that apply.

   a. charAt()
   b. []
   c. {}
   d. None of the above.

   Answer: a, b

7. (3 pts) What is the output of the following code fragment?

```
let s1 = Symbol("Test2"), s2 = Symbol("Test2"), s3 = Symbol("Test3");
if (s1 === s2) { document.writeln("S1<br>"); }
if (s1 === s3) { document.writeln("CASE<br>"); }
document.writeln("DONE");
```

   Answer: DONE

8. (3 pts) What is the difference between Global isNaN() and Number.isNaN()?

   a. There is no difference; they are equivalent.
   b. Global isNaN tries to convert the argument to a number.
   c. There are two unrelated functions.
   d. None of the above.

   Answer: b

9. (3 pts) What is the output of the following statement?

```
document.writeln("F: " + typeof new Array(2) + "<br>");
```

   a. F: object
   b. F: Array
   c. F: undefined
   d. None of the above

   Answer: F: object

10. (3 pts) Which of the following will always work when trying to identify an object as an array?

    a. typeof
    b. instanceof
    c. Array.isArray()
    d. isNaN()
    e. None of the above

    Answer: c

11. (3 pts) Which of the following objects allow us to issue an AJAX request?

    a. XMLHTTPRequest
    b. Object
    c. JSONObject
    d. None of the above

    Answer: a

12. (4 pts) The function **stats** has the following prototype:

```
function stats(age, enterCollege, finishedCollege, school)
```

    Write a function call that will use the spread operator and the array [1990, 1994] in order to initialize the enterCollege and finishedCollege parameters. You can assume the age and school parameters are 20, and "UMCP", respectively.

    Answer: stats(20, ...[1990, 1994], "UMCP");

13. (4 pts) Rewrite the second assignment using template literals.

```
   let name = "Richardson";
   let introduction = "Dear Prof. " +  name;
```

    Answer: let introduction = `Dear Prof. ${name}`;

14. (4 pts) What is the output of the following code fragment?

```
let data = new Array(4);
data[0] = "red";
data[3] = "blue";
document.writeln(data[0] + ", " + data[3] + "<br>");
data.length = 2;
document.writeln(data[0] + ", " + data[1] + "<br>");
```

    Answer:
        red, blue
        red, undefined

15. (4 pts) Using a single document.writeln print **true** if the first and last character of the string associated with a variable called **name** are the same, and **false** otherwise. You may not use conditionals (i.e., if statements).

    One Possible Answer: document.writeln(name[0] == name[name.length - 1]);

16. (4 pts) Using the => operator initialize the variable **myFunc** with a function that takes no parameters and returns the value 400.

```
let myFunc =
```

Answer: () => 400

17. (6 pts) Provide an expression that relies on Math.random() that assigns to x a random integer value in the range [1, 20]. Notice the range includes 1 and 20.

let x =

Answer: let x = Math.floor(20 * Math.random()) + 1

18. (8 pts) Complete the assignment below so the reversed string (“30, 20,10”) is assigned to **result.** You may only use a single assignment otherwise you will not receive credit.

```
let line = "10, 20, 30";
let result = YOUR CODE HERE
```

One Possible Answer: line.split(",").reverse().join(",");

19. (8 pts) Print the contents of the following map using a **for of** loop and document.writeln. The expected output is:

```
 Course: cmsc132, Value: 4
Course: cmsc389N, Value: 3
```

```
let map = new Map();
map.set("cmsc132", 4);
map.set("cmsc389N", 3);
```

One Possible Answer:

```
   for (let [key, value] of map) {
       document.writeln("Course: " + key + ", Value: " + value + "<br>");
    }
```

20. (8 pts) Using the sort array function and anonymous functions, define the function used by sort that will sort the elements of the **students** array by increasing gpa value.

```
let students = [
    { name: "Kelly", gpa: 3.7},
    { name: "Sam", gpa: 4.0},
    { name: "Peter", gpa: 2.3}
];
```

students.sort(YOUR FUNCTION HERE)

One Possible Answer: **students.sort(function (x, y) { return x.gpa - y.gpa; });**

21. (7 pts) Define your own Error type called **InvalidPasswordError**. The following is an example of the using your Error type.

```
try {
   let code = prompt("Enter password");
   if (code != "terps")
      throw new InvalidPasswordError("Invalid password");
    document.writeln("Welcome<br>");
} catch(error) {
    alert(error.message);
}
```

Answer:

```
function InvalidPasswordError(message) {
    this.message = message;
}
InvalidPasswordError.prototype = new Error();
```

Problem #2 (JavaScript Coding/Custom Types)

Write **JavaScript (NOT PHP)** that defines two "classes" using the approach presented in class. **If you use E6 class definitions (similar to what you have in Java) you will not receive any credit for this problem.**

1. **Game**
   a. Define a Game "class" that has two **private** variables named **name** and **price**.
   b. Define a constructor that has two parameters: name and price.
   c. Define two get methods, getName and getPrice, that return the name and price, respectively.
   d. The Game class has a prototype that defines a defaultLanguage variable with the value "English" and an overview() method that prints the name and price (see example below for format information).

2. **VideoGame**
   a. Define a VideoGame "class" that "extends" the Game class. The class has a **private** variable named memoryRequirements.
   b. Define a constructor that has three parameters: name, price, and memoryRequirements.
   c. Define a get method named getMemoryRequirements that returns the memoryRequirements.
   d. You need to define the appropriate prototype for this "class".

The following is an example of using the "classes" you will define.

```
main();

function main() {
    let game1 = new Game("Chess", 14.95);

    /* Game */
    document.writeln("Overview<br>");
    game1.overview();
    document.writeln("End Overview<br><br>");
    document.writeln("Game Name: " + game1.getName() + "<br>");
    document.writeln("Game Size: " + game1.getPrice() + "<br>");
    document.writeln("Game Language: " + game1.defaultLanguage + "<br><br>");


    let videoGame1 = new VideoGame("Netrix", 15.95, 4000);
    document.writeln("VGame Name: " + videoGame1.getName() + "<br>");
    document.writeln("VGame Price: " + videoGame1.getPrice() + "<br>");
    document.writeln("VGame Language: " + videoGame1.defaultLanguage + "<br>");
    document.writeln("VGame Memory Requirements: " + videoGame1.getMemoryRequirements() + "<br>");
    videoGame1.overview();
}
```

Output

```
Overview
Name: Chess, Price: 14.95
End Overview

Game Name: Chess
Game Size: 14.95
Game Language: English

VGame Name: Netrix
VGame Price: 15.95
VGame Language: English
VGame Memory Requirements: 4000
Name: Netrix, Price: 15.95
```

Game Class Answer:

```
function Game(name, price) {
    this.getName = function() {
       return name;
    }
    this.getPrice = function() {
       return price;
    }
}

Game.prototype = {
    constructor: Game,
    defaultLanguage: "English",
    overview: function() {
        document.write("Name: " + this.getName());
        document.write(", Price: " + this.getPrice() + "<br>");
    }
};
```

VideoGame Class Answer:

```
function VideoGame(name, price, memoryRequirements) {
    Game.call(this, name, price);

     this.getMemoryRequirements = function() {
        return memoryRequirements;
     }
}

 VideoGame.prototype = Object.create(Game.prototype);
 VideoGame.prototype.constructor = VideoGame;
```

Problem #3 (JavaScript Coding/Dynamic HTML)

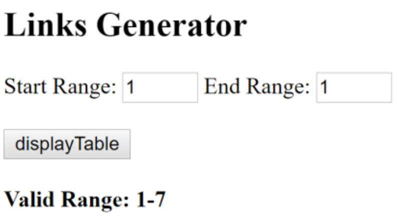
Write a **JavaScript (NOT PHP)** program that allow us to display in a table links to webpages. The links will be generated based on following array that will be a global variable:

```
let data = ["syllabus.html", "p1.html", "p2.html", "style.html", "email.html", "system.html", "process.html"];
```

For this problem:

- Define a form with two text fields and a button (see example below for format information).
- The first text field represents the first entry (position, not index) from the data array we want to use to generate links.
- The second text field represents the last entry (position, not index) from the data array we want to use to generate links.
- Both text fields have a default value of 1.
- Based on the text field values provided, your code will generate an HTML table where each entry is a link. For example, if the user enters 1 for both text fields, the table will have the HTML entry <a href=”syllabus.html”>syllabus.html</a>.
- Your code must work for values in the **data** array that are different than the ones we have provided.
- When the form is initially loaded, the message “Valid Range: 1-<END_RANGE>” where <END_RANGE> represents the last position in the array, must be displayed. For example, for the above array <END_RANGE> is 7, but this will change based on the **data** array we use.
- If the user enters an invalid range, the program will display the message “**Invalid range, valid range:** “ followed by 1-<END_RANGE>. Assuming <END_RANGE> is 7, the following will be considered a valid range: Start Range 2; End Range 5. The following will be invalid: Start Range: 8; End Range 16.
- A **main** function will define a function named **displayTable** as the function the **displayTable** button will call when selected. Feel free to add any other functionality to the main function you understand is needed.
- Notice that the HTML and JavaScript appears in a single file.
- Feel free to add any functions in addition to the displayTable and main functions.
- You can assume the above **data** array has been defined as a global variable in your code (you do not need to define it).

Form

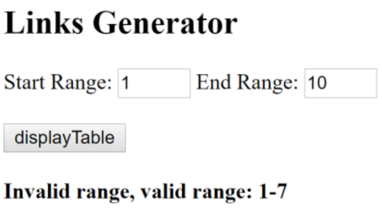


Links Generator

Start Range: 1 End Range: 1

Valid Range: 1-7

After Providing Invalid Range and Clicking on the Button

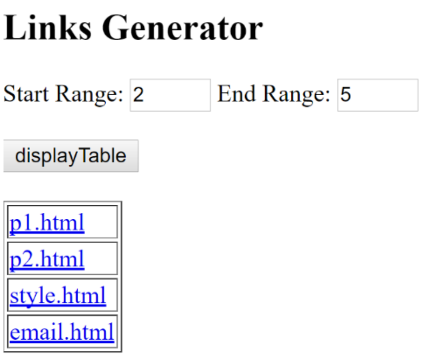


Links Generator

Start Range: 1 End Range: 10

Invalid range, valid range: 1-7

After Providing a Valid Range and Clicking on the Button



Links Generator

Start Range: 2 End Range: 5

p1.html
p2.html
style.html
email.html

One Possible Answer

```
<h2>Links Generator</h2>
Start Range: <input id="startNumber" type="text" value="1" size="3">
End Range: <input id="endNumber" type="text" value="1" size="3"><br><br>
<input type="submit" id="process" value="displayTable"><br><br>

<div id="display"></div>
<script>
"use strict";

let data = ["syllabus.html", "p1.html", "p2.html", "style.html",
                    "email.html", "system.html", "process.html"];
main();

function genLink(resource) {
       return "<a href=\"" + resource + "\">" + resource + "</a>";
}

function main() {
       let buttonInHTMLForm = document.getElementById("process")
       buttonInHTMLForm.onclick = displayTable; // DO NOT PUT ()
       let message = "<strong>Valid Range: 1-" + data.length + "</strong>";
       document.getElementById("display").innerHTML = message;
}

function displayTable() {
       let startNumber = document.getElementById("startNumber").value;
       let endNumber = document.getElementById("endNumber").value;
       let i, body;

       if ( startNumber < 1 || startNumber > endNumber || endNumber > data.length) {
             body = "<strong>Invalid range, valid range: 1-" + data.length + "</strong>";
       } else {
             body = "<table border='1'>";
             for (let i = startNumber - 1; i < endNumber; i++) {
                    body += "<tr>";
                    body += "<td>" + genLink(data[i]) + "</td>";
                    body += "</tr>";
             }
             body += "</table>";
       }
       document.getElementById("display").innerHTML = body;
}
</script>
```