CD Studio: JavaScript
Fall 2022
Midterm

Full Name

_____

This exam has 6 questions worth a total of 40 points. You have 60 minutes to complete it.

There is a mix of multiple choice and open ended questions. Partial credit will be given for answers which are not fully correct, but are in the right direction. If you aren't sure how to do something, write pseudo-code or comments to explain how you would try to do it.

This exam is worth 15% of your final grade.

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0. Init (1 point)

Write your name on the front of this exam.

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1. Primitives (5 points)

Assume we have the following variables in our JavaScript program:

```
let x = 5;
let y = 10;
let z = '10';
```

For each code statement on the left, write the letter of the best-matching output on the right. You may use each letter once, more than once, or not at all.

___ `1 + 2`	**A. true**
___ `x > y`	**B. false**
___ `x + y`	**C. 0**
___ `z + x`	**D. 1**
___ `y > x && (y - x > x)`	**E. 3**
	F. 10
	G. 15
	H. '105'

2. Programming concepts (5 points)

Which of the following are concepts that are part of JavaScript? Mark each statement as true or false by marking an x in the appropriate column.

`true`	`false`	
___	___	Every for loop can be rewritten as a while loop.
___	___	After you declare and initialize a variable using the `const` keyword, you can change its value if you do so in the same scope.
___	___	An array can contain arrays inside of it.
___	___	If a variable is declared and initialized inside a `for` loop, that variable cannot be accessed outside of that loop.
___	___	The running time complexity of a standard `for` loop going through an array of length `N` is `O(log N)`.

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3. For loops (9 points)

For each of the following snippets of code, determine the value of the variable **`count`** after the code has executed.

```
let count = 0;
let students = ['Yerin', 'Chris K', 'Hope', 'Haley', 'Selina',
'Rosie', 'Luna', 'Graeme', 'Khe', 'Chris P', 'Anaïs', 'Alex',
'Haotian', 'Evelyn', 'Sora'];

for (let i = 0; i < students.length; i++) {
  count = count + 1;
}
```

```
let count = 0;
let students = ['Yerin', 'Chris K', 'Hope', 'Haley', 'Selina',
'Rosie', 'Luna', 'Graeme', 'Khe', 'Chris P', 'Anaïs', 'Alex',
'Haotian', 'Evelyn', 'Sora'];

for (let i = 0; i < students.length; i++) {
  if (students[i] === 'Eric') {
    count++;
  }
}
```

```
let rank = ['2', '3', '4', '5', '6', '7', '8', '9', '10', 'J', 'Q',
'K', 'A'];
let suit = ['spades', 'hearts', 'diamonds', 'clubs'];

let count = 0;

for (let i = 0; i < rank.length; i++) {
  for (let j = 0; j < suit.length; j++) {
    count = count + 1;
  }
}
```

4. Debugging (6 points)

The three sets of code have an error in them that is causing them to not behave as expected. Each set of code begins with a comment explaining its desired behavior. Circle the error and explain the correction needed in order for the code to function properly.

```
// Prints out all of the entries of the array
let days = ['Mon', 'Tue', 'Wed', 'Thu', 'Fri', 'Sat', 'Sun'];
days.forEach((day) => {
  console.log(days);
});
```

```
// A function which calculates the area of a triangle using the
// formula 1/2*h*b and returns it, and code that prints out
// the result of calling the function.
let area = (h, b) => {
  let a = 0.5 * h * b;
}

console.log(area(5, 4));
```

```
// A for loop that calculates the product of all numbers from
// 1 to n inclusive.
let n = 5;
let product = 1;
for(let i = 1, i <= n, i++) {
 product = product * i;
}

console.log(product);
```

5. Recursion (4 points)

Write out the console output of this program's execution.

```
let searchArray = (key, a) => {
  return search(key, a, 0, a.length);
}

let search = (key, a, lo, hi) => {
  if (hi <= lo) {
    return -1;
  }
  let mid = Math.floor(lo + (hi-lo)/2);

  console.log(a[mid]);

  if (a[mid] > key) {
    return search(key, a, lo, mid);
  } else if (a[mid] < key) {
    return search(key, a, mid+1, hi);
  } else {
    return mid;
  }
}

searchArray(0, [0, 2, 4, 6, 9]);
```

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6. Object oriented programming (10 points)

Back to our course registration example, we have a JavaScript class that handles basic student course registration. However, two key functions are yet to be implemented. Implement the **`addStudent()`** and **`printStudents()`** functions.

```
Let exampleStudent = {
  name: 'Example name',  //Student name
  year: 4,  // 1, 2, 3, or 4
  major: 'CD', // Their major
};
```

The **`addStudent()`** function takes a parameter of **`student`** with an example structure above. It should then:

- Only enroll the student if the course is not at capacity.
- Only enroll the student if they aren't already enrolled in the course (match on name only).
- Add the student to the enrolled **`students`** array if their enrollment was successful.
- Return **`true`** or **`false`** depending on if enrollment was successful.

The **`printStudents()`** function should print all students currently enrolled to the console using **`console.log()`**. The format, based on the given example student, should be as follows:

```
Example name, CD, Senior
```

As you can see, you will need to format the print outs of all students, separating their name, major, and year with a comma. In addition, you should replace their year with a string, replacing **`1`** with **`Freshman`**, **`2`** with **`Sophomore`**, **`3`** with **`Junior`**, and **`4`** with **`Senior`**.

```
class Course {
  instructor; // 'Eric Li'
  capacity; // 10
  room; // Room object
  students = [];

  constructor(instructor, capacity, room) {
    this.instructor = instructor;
    this.capacity = capacity;
    this.room = room;
  }

  addStudent(student) {









}
```

```
printStudents() {









  }
}
```