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DV311 Final

September 15th 2011

For this test you can assume there is a printLine() function. The printLine function takes a variable number of arguments separates them with spaces and displays them on the page followed by a newline character (Just like the one from the homework).

There are a total of 115 possible points on the test. Your grade will be out of 100 however, so there is possibility of earning up to 15 bonus points.

I recommend getting the ones you know first and coming back for the rest.

#1 [14 points]
Write some javascript that draws a 5x5 black rectangle on a canvas and moves it across the screen. The following variables and functions are at your disposal:
- **ctx**: contains the canvas 2d context
- **ctx.fillRect(x,y,width,height)**: fills a rectangle using the specified arguments with the *fillStyle*.
- **ctx.fillStyle:** a property of the drawing context that can be set to a color and is used when calling fillRect
- **setInterval(function, interval_in_milliseconds):** call this with a function and an interval and the function will be called on the specified interval.
- **canvasWidth, canvasHeight:** the width and height of the canvas

(Definition From wikipedia)
In mathematics, the factorial of a non-negative integer n, denoted by n!, is the product of all positive integers less than or equal to n. For example,
5! = 5 x 4 x 3 x 2 x 1 = 120

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The value of 0! is 1, according to the convention for an empty product.

#2 [10 points]
Write a factorial function using **recursion** that takes a Number, *num*, and returns the factorial of *num*.

factorial(5) should return 120. factorial(4) should return 24. factorial(0) should return 1.

#3 [10 points]
Now write another factorial function that produces the same results but **does not use recursion.**

#4 [4 points]
What is the syntax to create an empty object? What about an empty array?

#5 [4 points]
Create an object using the object literal syntax that holds the following information about you:

first name, last name, major, and favorite color.

#6 [4 points]
What does the following code print:

```
var sprinkles = { name: “sprinkles”, type=”cat” };
var name = sprinkles.name;
name = “harry”;
printLine(name);
printLine(sprinkles.name);
```

#7 [4 points]
What does the following code print:

```
var sprinkles = { name: “sprinkles”, type=”cat” };
var harry = sprinkles;
harry.name = “harry”;
printLine(harry.name);
printLine(sprinkles.name);
```

#8 [4 points]
What is in the **in** operator used for? Give an example.

#9 [14 points]
Write a function that takes an object and prints its property names and associated values. Don’t worry about nested objects. For example:

calling printObject	produces....

printObject({
        name: “Elliot”,
        weight: 9.5,
        dad: “Jon”,
        mom: “Julie”
});
	name: Elliot
	weight: 9.5
	dad: Jon
	mom: Julie

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#10 [15 points]
Create a **Car** constructor function that has the following attributes:
- A private variable **mileage** that starts at 0.
- A private variable **lastRotation** that starts at 0 and is set to the current mileage when the car's rotateTires method is called.
- a public method **drive** that increments mileage by the miles given
- a public method **needsRotation** that returns true if the *lastRotation* was done more than 10,000 miles ago.
- a public method **rotateTires** that sets the *lastRotation* to the current mileage.

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#11 [7 points]
Use the Car constructor function you just wrote to:

- create a new car
- drive it for 3,000 miles
- check if it needs a tire rotation
- if so rotate the tires
- drive for 9,000 miles
- check if it needs a tire rotation
- if so rotate the tires

#12 [5 points]
What does the following print?

```
var s = "foo";
function a(){
   function b(s){
      printLine(s);
   }
   function c(){
      s = "baz";
   }
   c();
   b(“bar”);
}
a();
printLine(s);
```

#13 [10 points]
Write a reverseArray function that takes in an array and returns a reversed version of it. You **cannot** use the native array.reverse(). For example:

reverseArray([1,2,3,4,”foo”, 5])   →   [5,”foo”,4,3,2,1]

#14 [5 points]

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The following code creates a multidimensional array called **board** that simulates a tic-tac-toe board:

```
var board = [];
var rows = 3, cols = 3;
for(var i = 0; i < rows; i++){
   var row = [];
   for(var j = 0; j < cols; j++){
      row[j] = Math.random() > .5 ? 'X':'O';
   }
   board[i] = row;
}
```

Write some code that will print the mark in the middle of the board:

#15 [5 points]

Give the variable **classes** print each class (separated by a space) on a different line. Your program should print:

```
article
first
feature
```

```
var classes = “article first feature”
```