Midterm Exam #1 Review Guide

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Further Reference: For further information, please post a question on Piazza or attend office hours at the times presented at
https://www.cs.umd.edu/class/fall2023/cmsc335/officeHours.shtml.

Contents

1. How to write the HTML that goes in the <body></body> section. You don't need to know the tags associated with the header (only the <title> and <link> tags).

   a. <title> tag

This tag serves no purpose with respect to content found in the body of the HTML file. However, the <title> tag is found in the head of an HTML document. This placement of the <title> tag indicates that it serves some purpose in the head of the document, which it does. The <title> tag indicates to a web browser (or Live Server) what title to display for the associated HTML page. In fact, the purpose that <title> serves for an HTML page is so important that it is actually a **required** tag when writing any HTML file.

   b. <link> tag

The <link> tag, like the <title> tag, is found in the head of an HTML document. The <link> tag can serve many purposes, but the most common one is to serve as a reference parameter to any external resource files that the HTML file itself is dependent on. Just like the <title> tag, the <link> tag serves no purpose to the body of an HTML document but serves a purpose for the HTML document in relation to how it is rendered as the <link> tag most often defines the style via link to external stylesheet(s).

2. You are only responsible for HTML tags that allow us to:

a. Define tables.

Table **Header**: <thead></thead>
    Attributes:
        1. **row**span→ number of rows to merge
        2. **col**span → number of columns to merge
Table **Heading:** <th></th>
Table Row: <tr></tr>
    Attributes: **Row**span → number of rows to merge
Table Data (Element): <td></td>
    Attributes:
        3. **row**span→ number of rows to merge
        4. **col**span → number of columns to merge
Table **Footer:** <tfoot></tfoot>
    Attributes:
        1. **row**span→ number of rows to merge
        2. **col**span → number of columns to merge

b. Define ordered and unordered lists.

Ordered List:
Ordered List Types:
1. type = '1' → numbered list
2. type = 'i' → Numbered List, Roman Numerals
3. type = 'a' → List with numbers as letters (a = 1, b=2, c=3, etc.)
Unordered List:
List Item:

c. Define forms using text fields, buttons, reset, and submit buttons. You don't need to know any other form elements (e.g., radio buttons, etc.).

Define a form: <form></form>
Text fields: <input></input>
Text Field Types:
1. **Button**
2. **Checkbox**
3. **Color**
4. **Date**
5. **Datetime Local (Local Date/Time)**
6. **Email**

7. **File**
8. **Hidden**
9. **Image**
10. **Month**
11. **Number**
12. **Password**
13. **Radio**
14. **Range**
15. **Search**
16. **tel (telephone number)**
17. **text**
18. **time**
19. **url**
20. **week**

Reset Button: use <input></input> with type = 'reset'
Submit Button: use <input></input> with type = 'submit'

d. Other tags you should be familiar with:

i.

The <br> tag is intended to add a line break between the elements immediately preceding and following the <br> tag. This tag is formerly the </br> tag, but the self-enclosing <br> tag is the current version. Please use <br>.

ii.

The tag is intended to **bold** text. The tag is applicable anywhere, but the **boldface** applies to only whatever appears in between the and tags.

iii.

The tag is intended to *italicize* text. This tag is applicable anywhere and is often used in combination with the <strong> tag to produce **bold, italicized** text. Analogously to the <strong> tag, the effect of *italicization* applies only to whatever appears in between the and tags.

iv. <h1></h1>

The <h1> tag is the **strongest** of a set of six similar tags (h1, h2, h3, h4, h5, h6) that all serve the same purpose. The <h1> tag is used to indicate important headings, such as those for sections or paragraphs within a document. It is, by default, 32px **bold** font. Usually, the h1 tag is

the first heading tag used and often precedes tags such as <p>, <pre>, and <article>; but can precede many others.

v. <div></div>

The <div> tag is a key tag when it comes to organization within an HTML document. Often, the <div> tag is used to split sections within an HTML document and is often styled to look like a box using CSS (to be discussed later in this document). The <div> tag does have attributes, but the only ones that are ever used in practice are **name** and **id**. In most uses of the <div> tag, the <div> tag itself will contain other tags within it, such as <p>, <pre>, and <article>.

vi.

The <span> tag serves an identical purpose to the <div> tag, serving as a container. Often the <span> tag can take the place of a <div> tag except that the <span> tag displays the container created as an **inline** element as opposed to the **block** display style of the <div> tag. Nowadays, the <div> tag has fallen into disuse because of its block display style in favor of the <span> tag.

vii. <p></p>

The <p> tag is one of the most basic HTML tags. The purpose of this tag is to set aside space to write a paragraph in the document. The <p> tag is one of the most used tags but is slowly being phased out in favor of other more robust tags such as <pre>. This is because any text that is placed in a <p> tag is done so in a linear manner, meaning that spacing between lines is neither preserved nor respected.

viii. <pre></pre>

The <pre> tag is the most used alternative to the <p> tag. The usage of this tag is mostly the same as the <p> tag in that the <pre> tag is used to write paragraphs in an HTML document, but the one difference that makes the <pre> tag more desirable as compared to the <p> tag is that the <pre> tag does respect spacing within the text input to the <pre> tag.

ix. <img>

The <img> tag is one of three special tags used for media inclusion in HTML files. As the abbreviated name suggests, the <img> tag is used to include images into an HTML file. Often, images that are included in HTML files are elsewhere in the directory or even online. As such, some of the commonly used attributes of the <img> tag are:
1. src →image source
2. width → image width
3. height → image height
4. alt → Alternate Text to display in the event that the image cannot be rendered.

x. <a>

The <a> tag is a tag that is used for more than one purpose. However, the most common use of the <a> tag is to include links using the 'href' keyword within the tag. Just like the image tag, the <a> tag has many attributes, but the most used ones are:

- href → link source (URL)
- alt → text to display when link cannot render

Unlike the <img> tag however, the <a> tag does have a closing tag and usually it is the text appearing between the <a> and tags that is seen on the screen as the "display value" for a particular link.

3. Block vs. inline HTML elements

	Block Elements	Inline Elements
Width	Stretches as far Left and Right as possible	Takes up only as much space as is needed for it to fit
Starts	Begins on a new line, aligned to the left margin	As the name suggests, this begins on the line it is declared
Example Tags	<p> | <table> | <div> | <h1>	<img> | <a> | <strong> | <em>

4. You are only responsible for the following CSS properties:

a. Color

The color property in any CSS document specifies the color of the text for the element that the color property is applied to.

b. font-size

The font-size property in any CSS document specifies the font size of the text for the element that the font-size property is applied to.

c. background-color

The backround-color property in any CSS document specifies the background-color of the element to which the background-color property is applied.

5. How to include CSS using inline, internal and external approaches

Inline Styling:	Internal Styling:	External Styling:
1. Style is applied to a specific tag 2. Usually done using a tag's 'style' attribute Warning: **Avoid if possible**	1. Done by using the <style> tag in the document header 2. Convenient to provide style to one specific page	1. Done with the help of external style sheets 2. Usually requires usage of the <link> tag Note: **This is the preferred approach when styling HTML**

6. You are only responsible for the following CSS selectors:

a. type (e.g., h1, h2, p, table) selectors

These are the most basic type of selector. These are sets of CSS rules that are applied to a document, but only to elements of a specific type (specified by the tag prior to the declaration). This type of selector can be created with the following syntax: **<tag>{CSS}**

b. class selectors

These are selectors that allow us to apply a set of CSS rules across various different elements without having to redeclare the set of rules individually. These are created with the following syntax: **.[name_of_class]{CSS}**

c. id selectors

These are selectors that allow us to define a set of rules and then use it in multiple places just as class selectors do. However, Class selectors can appear multiple times in the same CSS document, but ID selectors appear only once. Usually they are used if a style only needs to be applied once or needs to be applied in a particular manner to a particular ID. This kind of selector can be created with the following syntax: **#[ID]{CSS}**

d. descendant selectors

These selectors are designed to specify styles for elements within other elements (paragraph in a div, link in a footer, etc.). These are designed to override the default type, class, and ID selector styles that have already been defined. These selectors can be created as follows: **<tag> <subtag>{CSS}**

e. pseudo-classes for link (a:link, a:visited, a:hover, a:active)

A pseudo class selector is one that serves as a "phantom class" of sorts. It allows style to be assigned to any element not based on the type of element, but rather based on the state of the element. The 'link' pseudo classes are designed to be able to apply a style based on if a link is in one of the 4 common states: unclicked (link), clicked (visited), checking (hover), open (active)

f. :hover pseudo-class

The hover pseudo-class is applicable to any element. It serves the purpose of allowing us to define style if the element in question is being hovered over. Often we see this pseudo-class associated with the <a> tag as links are most often hovered over, but this can be used for various operations on text content as well.

7. You should know how to write HTML that corresponds to a provided image. For example, we can provide an image with a table and a list, and you are expected to provide the appropriate HTML.

For this, please keep one tip in mind: **The HTML is far more important than the CSS. Try to get the HTML first and figure out the CSS later. For the CSS, colors do not likely need to be exact unless mentioned in the problem itself.**

8. Web Servers

   a. URLs

URI: Uniform Resource Identifier	URL: Uniform Resource Locator
	1. A URL is a subcategory of URI that is both an identifier and provides information on how to access (locate) the resource. 2. A URL can, just for example: a. Represent a web resource b. An Arbitrary File c. A Web Page

   b. HTTP post and get

	Post Request	Get Request
Form Information	Form information is in the **message body**	Form information is provided in the **URL** itself
Bookmarked	A HTTP Post **cannot** be bookmarked	An HTTP Get **can** be bookmarked.
Limit of Data	There is **no data limit** since a post request isn't associated with a URL.	There is a **data limit** because Get requests modify the URL, meaning that **the URL size is the limit of the data**.
Security	Better at security since information is **hidden**.	Poor for security since the information is **visible in the URL.**
Example	Issues **warning** prior to execution	Intended for search operations that **do not change the server's state.**

c. What is a port and how it is used in an URL

The **port** of a URL is where a server will connect to the local host to send and retrieve information. Usually the port is specified to determine multiple things such as the protocol being used and the server being used. Although this is extra information, HTTP (standard) uses port **80** whilst HTTPS (secure) uses port **443** by default.

9. XAMPP:

a. What is htdocs

htdocs is the default storage folder within XAMPP. When using XAMPP to store files that require the use of a hosted server (as compared to the default LiveServer in VSCode), htdocs is the place where those files are stored. The user can add more folders to organize their files, but in order to use XAMPP and the local server, the files must be stored within htdocs.

b. What is localhost and 127.0.0.1

Localhost and 127.0.0.1 are both the same thing. In the context of XAMPP and web servers, localhost and 127.0.0.1 both represent the standard server address for the **local machine**. When a web server is started, the address of the server, should one wish to access it, is either localhost/ or 127.0.0.1/ depending on which one is working at the time.
Advice: If one isn't working, try the other. If neither is working, check that the server application (XAMPP→Apache) is running.

c. What is index.html

index.html is the baseline HTML file provided when the first instance of XAMPP or a particular folder is started. If localhost opens, at least for XAMPP, to the XAMPP distribution page, look for index.html within htdocs and rename it. Reloading the server should provide a listing of the directory's files as opposed to the XAMPP distribution page. It is also recommended to always have an index file when working with server based applications or applications that will leverage the server.

d. Server side includes (what they are, not the actual syntax to include a file)

Server-Side Includes are lines of code placed within an html file (only those ending in **shtml, stm, or shtm)** that are used to either link to other files or perform system tasks when the file is displayed with the aid of the XAMPP Apache Server. Server-Side Inclusion is an interpreted server-side scripting language.

10.   JavaScript Basics:

a. What is ECMAScript

ECMAScript is the style guide for Scripting Languages. It is produced by ECMA international and is the specifications and set of rules that a scripting language must observe to be considered ECMAScript compliant

b. What is a JavaScript engine

JavaScript is a general scripting language that is considered to be ECMAScript compliant. The JavaScript Engine is the utility that processes JavaScript code in different browsers.
This is extra information, but I am including a table of the browsers and their JS Engines below.

Browser	JavaScript Engine
Safari	JavaScriptCore
Chrome	V8
Firefox	Spidermonkey
Edge	Chakra

c. How to include JavaScript in an HTML file

Internal: Use the <script> tag for any JS code	External: Use the <link> tag to link to a .js file

d. What is the DOM

The DOM is the **D**ocument **O**bject **M**odel. It is designed to represent a document as a tree where each node is an object that represents a part of the document. Every branch of the DOM tree ends in a node and each of these nodes contain objects. The DOM model also allows us "programmatic access" to the tree, allowing us to change the structure, style, or content of a document. Every node (portion of a document) has an event handler associated with it, and these handlers are executed if an event is triggered.

e. Function execution context

Just as was seen in Java (remember the long red stack trace from eclipse?), JS functions also generate frames on the "stack". Every function call creates what is known as a "**function execution context"** which is just a fancy way of saying **"stack frame".**

11.   JavaScript

a. Comments

Single Line: //	Multiline: /* */

b. Variable declarations using let, const, var

Let	Const	Var
This declaration is used for declaring variables.	This declaration is used for declaring constants	This is deprecated, please **avoid.**

Things to know about declaring variables in JS:
1. There is no type
2. Variables must begin with:
    a. Letter
    b. Underscore
    c. Dollar Sign
3. Variables can only contain:
    a. Letters
    b. Numbers
    c. Underscores
    d. Dollar Signs

c. Primitive types

Primitive types are **static** data types that are not objects and they also have no methods.
Furthermore, **all primitive types are immutable.**
There are 7 primitive types in JavaScript:
1. Null
2. Boolean
3. Number
4. String
5. Undefined
6. Bigint
7. Symbol

d. Reference types

Reference Types are those that represent addresses of objects. All reference types in JavaScript refer to Objects, which are a collection of properties.

e. Type conversions using Number()

This conversion is used to go from String to Number. It is much stricter than parseInt or parseFloat because the input to Number must be a number and nothing else.
Here are the three conversions:

```
1. let number = Number(stringValue)
2. let number = parseInt(stringValue)
3. let number = parseFloat(stringValue)
```

f. Reading data using prompt()

The prompt() function is one that displays a dialog box, often with a specified title. It can be used to read any data and the default, should nothing be entered, can be specified after the title of the aforementioned prompt.

g. Display results using document.writeln()/write() and alert()

Document.writeln()	Document.write()	Window.alert()
Generates text output, but **automatically adds new line at end of output**	Generates text output, but **does not** add new line at the end of the output	Generates text output, does not add new line, but **displays in window** as opposed to on the document.

h. Mathematical, logical and relational expressions

Relational	Mathematical	Logical
=== → true if equal, false otherwise	+ → Addition	! → not
!== → true if different, false otherwise	- → Subtraction	&& → and
< → less than	* → Multiplication	|| → or
> → greater than	/ → Division	?: → Ternary
<= → Less than or Equal To	** → Exponentiation	++ → Increment
>= → Greater than or Equal to	% → Modulus (remainder)	-- → Decrement

Notes:
1. == checks for value only, === checks for value and type
2. != checks for value only, !== checks for value and type

i. Conditional statements

Just as with any other language, JavaScript has conditional statements. These are often found in conjunction with Control Structures and are often used to provide a stopping condition. Conditional statements are designed to serve a particular purpose if the condition is true, and a different purpose should the condition be false.

j. Loop constructs - while, do-while, for loops

While	Do-while	For
```while (expression 1) { // code block to be executed }```	```do{ // code block to be executed } while (expression 1)```	```for (expression 1; expression 2; expression 3) { // code block to be executed }```
Expression 1: Conditional The loop will run until this becomes false	Expression 1: Conditional The loop will run until this becomes false	Expression 1: initialization The variable for the loop is declared here Expression 2: Conditional The loop will run until this becomes false Expression 3: Increment/Decrement The loop will modify the variable by +1/-1 each loop

k. break, switch statements

Break statements allow us to stop execution of a loop immediately when a condition becomes true. These are often used in conjunction with continue statements, which help to skip certain iterations of a loop where a condition is met.

Switch statements allow us to perform a specific task based on the value of an input received. Usually there are various "cases" and one "default" in the event that the input does not match any one case.

```
switch(expression) {
  case x:
    // code block
    break;
  case x:
    // code block
    break;
  default:
    // code block
}
```

l. "use strict";

1. Allows users to opt-in to a strict mode of JS in which
   a. "Silent" errors (warnings in standard JS) are thrown
   b. Prohibits some common syntax that is allowed in more "loose" JS

m. Only console.log

Shows output of functions in JavaScript to the console of the web browser running the file. console.log is used to show general messages to the user whilst different versions of the console object are used to show different messages.

n. isNaN()

The isNan() method does what it suggests. It checks whether whatever is passed as a parameter to the method is or isn't a number. If the value isn't a number, it returns true and returns false if the value is a number.

o. window object

1. Represents the window in which a page is displayed
2. Provides access to other global objects, namely the document being displayed
3. Keeps track of the user's global variables
4. Allows JS to access the API of the browser on which it is running

p. Function definition

Functions are:
1. Invoked using the () operator
2. **Do not use var, let,** or **const** for parameters
3. There is **no mandatory main function**
4. Return values using the **return** keyword
5. Recursion is supported.

Functions can be declared:
1. In the standard manner using the **function** keyword and the **()** operator
2. As a function expression (**anonymous** function)
3. Using the **function** constructor
4. Using the **arrow** method (**lambda expressions**)

q. One-dimensional array

An array is a special collection of objects that can either be treated as a unit or individually. To access elements of an array, use bracket indexing (**[ ]**).

Arrays can be declared:
1. By using the literal form → [<elements>]
2. By using the array constructor → new Array()

r. String methods - Only includes, trim, indexOf, toLowerCase, toUpperCase, charAt, split, localeCompare

Methods from the String Class
includes → Boolean method to check if a character is present in a string
trim →remove any whitespace from both sides of a string
toLowerCase→convert string to be entirely in lowercase
toUpperCase→convert string to be entirely in uppercase
charAt→ Character at a particular index within a string
split→convert a string to an array of characters
localeCompare→compares two strings, in the current locale, and returns their sorted order

s. for...of

for…of is used to create a loop that iterates over iterable objects such as strings, arrays, array-like objects, and other iterable objects.

t. for...in

for…in is used to iterate over the properties of an object.

u. Null

In JavaScript, Null is one of the seven primitive data types. In practice, null is used to represent the absence of some data.

v. Undefined

In JavaScript, undefined and null are different in that though both are primitive data types, Null solely indicates the absence of some data whereas undefined indicates that the data being looked for either was never defined or was never given a value.

w. NaN

NaN (Not a Number) can be generated when:
1. Arithmetic Computation results in an undefined or unrepresentable value
2. Coercion of non-numeric values to numeric values occurs with no predefined numeric equivalent of the value being coerced.

x. Math.sqrt()

Returns the square root of the numerical value provided as the parameter

y. Math.random()

This method returns a random number between 0 (inclusive) and 1 (exclusive). The range can be modified through multiplication (change the end) and addition (change the start).

z. Template literals

Template Literals:
1. Are String Literals that allow embedded expressions
2. Can replace placeholders in text with values of variables and expressions
3. Are defined using the backtick (`) character
   a. To find the backtick, look underneath the tilde (~) key on the keyboard at the left end of the number row.
   b. To escape a backtick (`) within a template literal, precede the backtick with a backslash (\)
      i. The backslash is nestled between the backspace/delete and enter/return keys on the keyboard