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Full Names: Anene Terefe____________________________

Web Application Programming (CS472) (45 points)

(April 2020)

Instructor: O. Kalu

Midterm Exam

1. The exam duration is 2 hours.
2. The exam is an online, computer-based exam; so you may use a computer for both the Part 1 (theory) and Part 2 (coding) tasks.
3. **This exam paper document is a copyrighted material and so it must not be copied or reproduced or transferred or shared or distributed**.
4. You are expected to use an IDE or any Code Editor tool of your choice to implement your solutions for the questions in the Part 2 (Web Application Coding).
5. During the exam, if you have any question, please **send it via a Chat to me** in the MS Teams app.
6. Upon completion, put your entire Exam (including the projects/folders with your **source code** and this document with your typed-in answers) into a single zip file named **MidtermExam.zip**, and submit to Sakai, under the Assignment titled, "Midterm Exam".
7. **NOTE**: ***If you fail to submit your exam to Sakai because it has past the Submission due time, and you then email it instead, then be aware that your maximum possible score will be 83%,and only if your work scores up to that level.***

Make sure to include the screenshots of your results, where it is required.

(CS472 - WAP)
(April 2020)
Part 1 - Theory (10 points)

Part I – Theory (True/False, Short answers, Multiple choice questions): (10 points)

Note: *For these questions, please follow the instructions given for each individual question and do type all your answers right here in this document.*

1. (8 points) Answer the following questions with True or False. For each answer, give a rationale (i.e. If True state how, if False state why. No rationale, earns you just half of the points if your True/False answer is correct, and zero point if your True/False answer is incorrect).

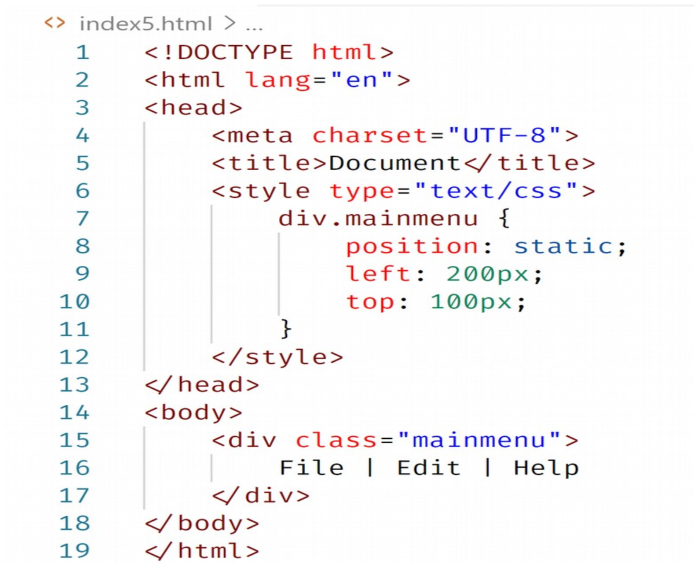
I. (2 points) In order to create a sub-form inside a Web-form, an HTML <form> element can be contained or nested inside another HTML <form> on a web page.

True or False?

______________False______

Rationale: ___Because nested form is not allowed. Every form must not contain another form. But we can have multiple forms which are not nested. _

II. (2 points) Consider the HTML markup and CSS styling code presented in the Figure below.



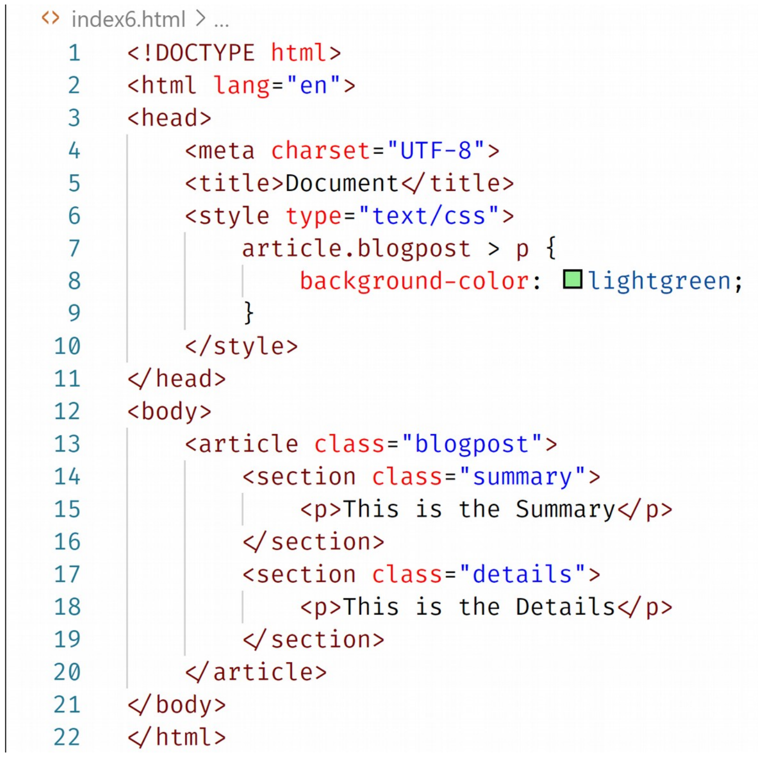
```
<> index5.html > ...
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
    <style type="text/css">
        div.mainmenu {
            position: static;
            left: 200px;
            top: 100px;
        }
    </style>
</head>
<body>
    <div class="mainmenu">
        File | Edit | Help
    </div>
</body>
</html>
```

Based on the code, the <div> with class named, mainmenu, will be displayed on the webpage, positioned at 200pixels from the left margin and 100pixels from the top margin.

True or False?
False
____

Rationale: Because position is static which doesn't take left or right . Position relative or absolute takes the effect of left right top bottom.

III. (2 points) Consider the HTML markup and CSS styling code presented in the Figure below.



index6.html > ...

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
    <style type="text/css">
        article.blogpost > p {
            background-color: lightgreen;
        }
    </style>
</head>
<body>
    <article class="blogpost">
        <section class="summary">
            <p>This is the Summary</p>
        </section>
        <section class="details">
            <p>This is the Details</p>
        </section>
    </article>
</body>
</html>
```

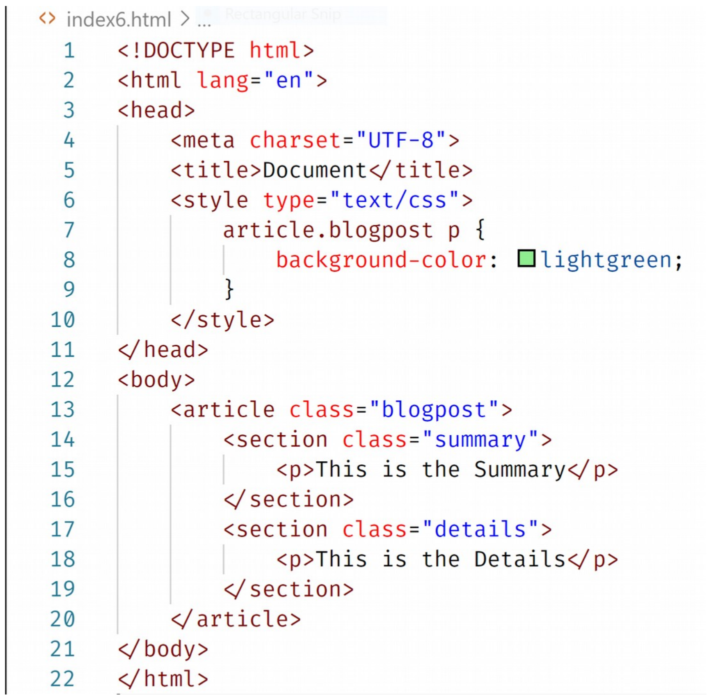
Based on the code, the two paragraphs inside the article will be displayed with background-color of lightgreen.

True or False?
False

____

Rationale: only the first paragraph background will be light green

IV. (2 points) Consider the HTML markup and CSS styling code presented in the Figure below.



```
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <title>Document</title>
    <style type="text/css">
        article.blogpost p {
            background-color: lightgreen;
        }
    </style>
</head>
<body>
    <article class="blogpost">
        <section class="summary">
            <p>This is the Summary</p>
        </section>
        <section class="details">
            <p>This is the Details</p>
        </section>
    </article>
</body>
</html>
```

Based on the code, the two paragraphs inside the article will be displayed with background-color of lightgreen.

True or False?

_____True__________

Rationale:

2. (2 points) What is the difference between the 2 CSS properties settings,

visibility: hidden versus **display: none**?

Visibility hidden will take space in the html but will be hidden to the user. However display: none won't take space in the html and it is hidden from the user.

(CS472 - WAP)
(April 2020)
Part 2 - Coding (35 points)

Part II – JavaScript/Web Application Programming skills: (35 points)

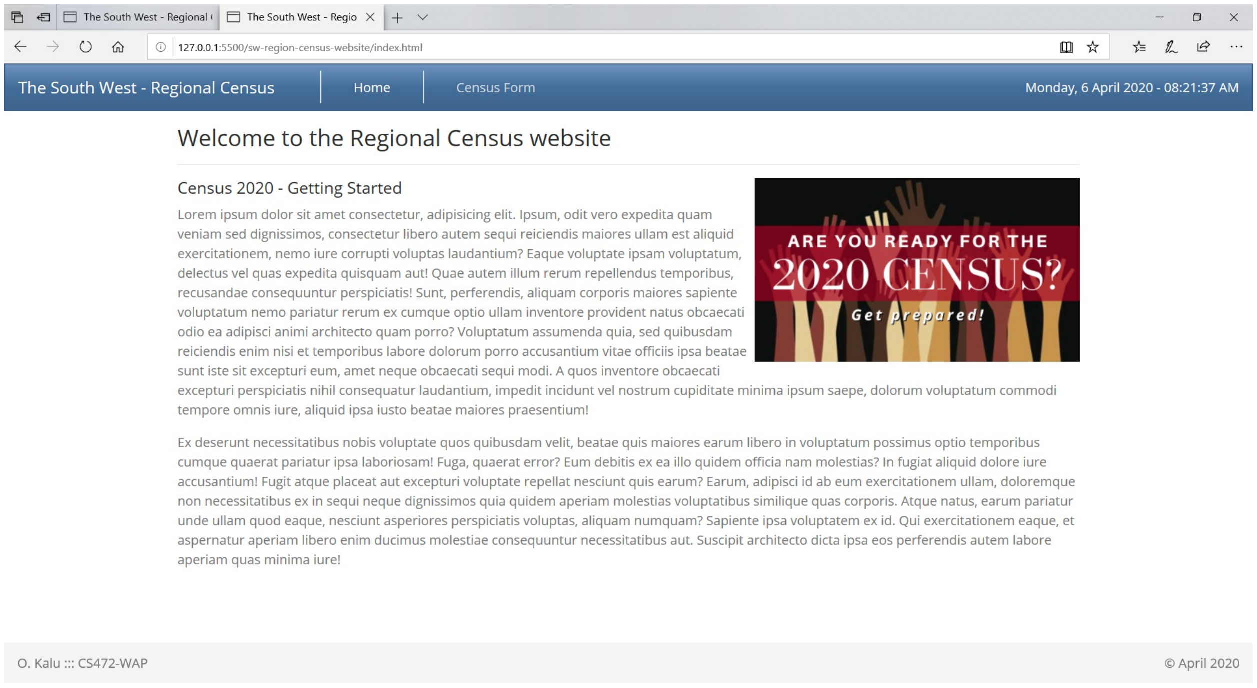
Note: *For the tasks in these questions, where applicable, you are expected to take screenshot(s) of your web UI(s), save into a .png or .jpg image file, placed inside a folder named, screenshots and include these in the MidtermExam.zip file, you submit or copy/paste your screenshots to the bottom of the associated question(s) right here in this document.*

3. (20 points) **Implementing a client-side JavaScript Web Application**

Assume you have been hired by the Regional Office of Census Administration of the South West states, USA. And they have tasked you to design and build a website for the 2020 Census, including just a homepage and a Census Data Collection form (see the sample web UIs shown below).

Using HTML, CSS and JavaScript, implement the website, as shown in the UI screenshots below, with the features and functionalities, specified/listed further below:

Homepage:


The South West - Regional (
The South West - Regio
127.0.0.1:5500/sw-region-census-website/index.html
The South West - Regional Census
Home
Census Form
ARE YOU READY FOR THE
2020 CENSUS?
Get prepared!

Monday, 6 April 2020 - 08:21:37 AM

Welcome to the Regional Census website

Census 2020 - Getting Started

Lorem ipsum dolor sit amet consectetur, adipisicing elit. Ipsum, odit vero expedita quam veniam sed dignissimos, consectetur libero autem sequi reiciendis maiores ullam est aliquid exercitationem, nemo iure corrupti voluptas laudantium? Eaque voluptate ipsam voluptatum, delectus vel quas expedita quisquam aut! Quae autem illum rerum repellendus temporibus, recusandae consequuntur perspiciatis! Sunt, perferendis, aliquam corporis maiores sapiente voluptatum nemo pariatur rerum ex cumque optio ullam inventore provident natus obcaecati odio ea adipisci animi architecto quam porro? Voluptatum assumenda quia, sed quibusdam reiciendis enim nisi et temporibus labore dolorum porro accusantium vitae officiis ipsa beatae sunt iste sit excepturi eum, amet neque obcaecati sequi modi. A quos inventore obcaecati excepturi perspiciatis nihil consequatur laudantium, impedit incidunt vel nostrum cupiditate minima ipsum saepe, dolorum voluptatum commodi tempore omnis iure, aliquid ipsa iusto beatae maiores praesentium!

Ex deserunt necessitatibus nobis voluptate quos quibusdam velit, beatae quis maiores earum libero in voluptatum possimus optio temporibus cumque quaerat pariatur ipsa laboriosam! Fuga, quaerat error? Eum debitis ex ea illo quidem officia nam molestias? In fugiat aliquid dolore iure accusantium! Fugit atque placeat aut excepturi voluptate repellat nesciunt quis earum? Earum, adipisci id ab eum exercitationem ullam, doloremque non necessitatibus ex in sequi neque dignissimos quia quidem aperiam molestias voluptatibus similique quas corporis. Atque natus, earum pariatur unde ullam quod eaque, nesciunt asperiores perspiciatis voluptas, aliquam numquam? Sapiente ipsa voluptatem ex id. Qui exercitationem eaque, et aspernatur aperiam libero enim ducimus molestiae consequuntur necessitatibus aut. Suscipit architecto dicta ipsa eos perferendis autem labore aperiam quas minima iure!

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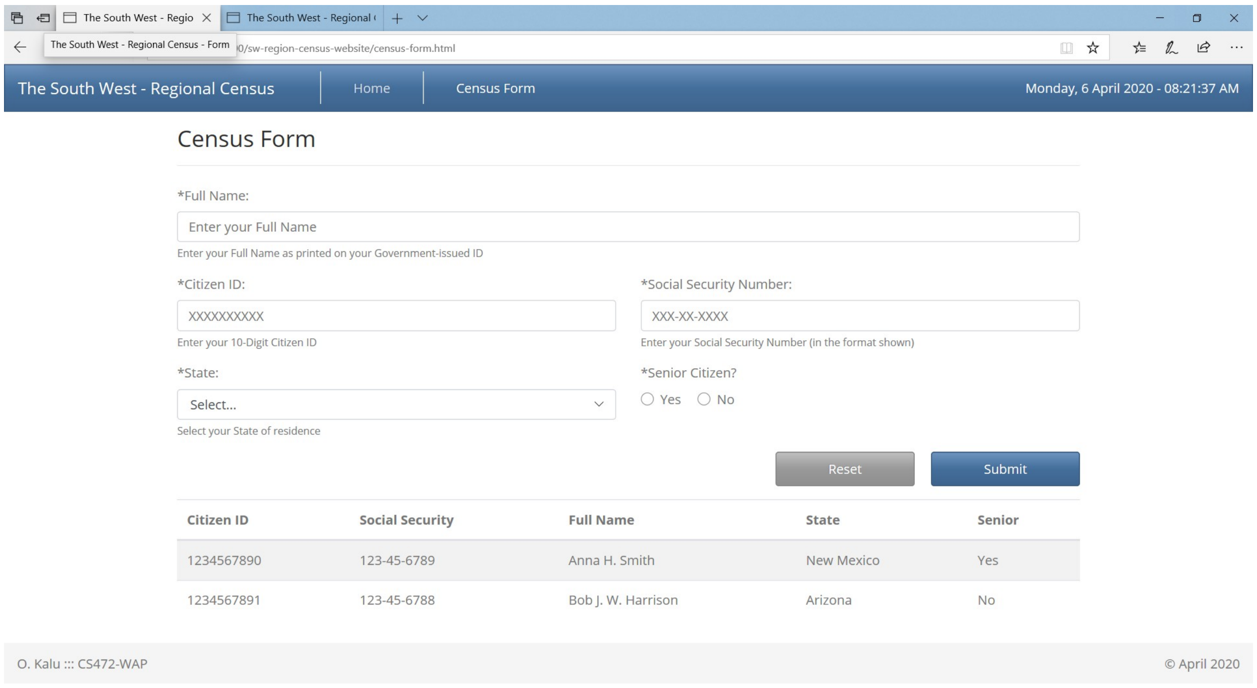
Census Form:


The South West - Regio
The South West - Regional
The South West - Regional Census - Form
0/sw-region-census-website/census-form.html
The South West - Regional Census
Home
Census Form
Monday, 6 April 2020 - 08:21:37 AM

Census Form

*Full Name:

Enter your Full Name

Enter your Full Name as printed on your Government-issued ID

*Citizen ID:

XXXXXXXXXX

Enter your 10-Digit Citizen ID

*Social Security Number:

XXX-XX-XXXX

Enter your Social Security Number (in the format shown)

*State:

Select...

Select your State of residence

*Senior Citizen?

Yes No

Reset Submit

Citizen ID	Social Security	Full Name	State	Senior
1234567890	123-45-6789	Anna H. Smith	New Mexico	Yes
1234567891	123-45-6788	Bob J. W. Harrison	Arizona	No

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1.1. Code the User interface of the web application using standards-compliant, semantically-correct HTML5 markup, including all the web pages and form fields as shown in the UI screenshots above.

1.2. Apply styling using Bootstrap or you may apply your own custom CSS styling to produce the same or similar look and layout. **Note:** Your UI does NOT necessarily have to be exactly the same as the sample shown above. But it should have all the necessary form data input fields, labels, images and buttons etc.

1.3. Citizen ID, Social Security Number, Full Name, State and Senior Citizen are all required data, to submit the Census form.

1.4. Add validation using appropriate regular expression to ensure that each Citizen ID and Social Security Number entered must be in the specified format of, XXXXXXXXXX and XXX-XX-XXXX, respectively, as shown on the Census form UI above. And where X is a numeric digit.

1.5. The user can record citizens' data for the following 3 states of the South West region – Arizona, New Mexico and Texas. Therefore, your drop-down list data field on the Census form should contain these 3 options.

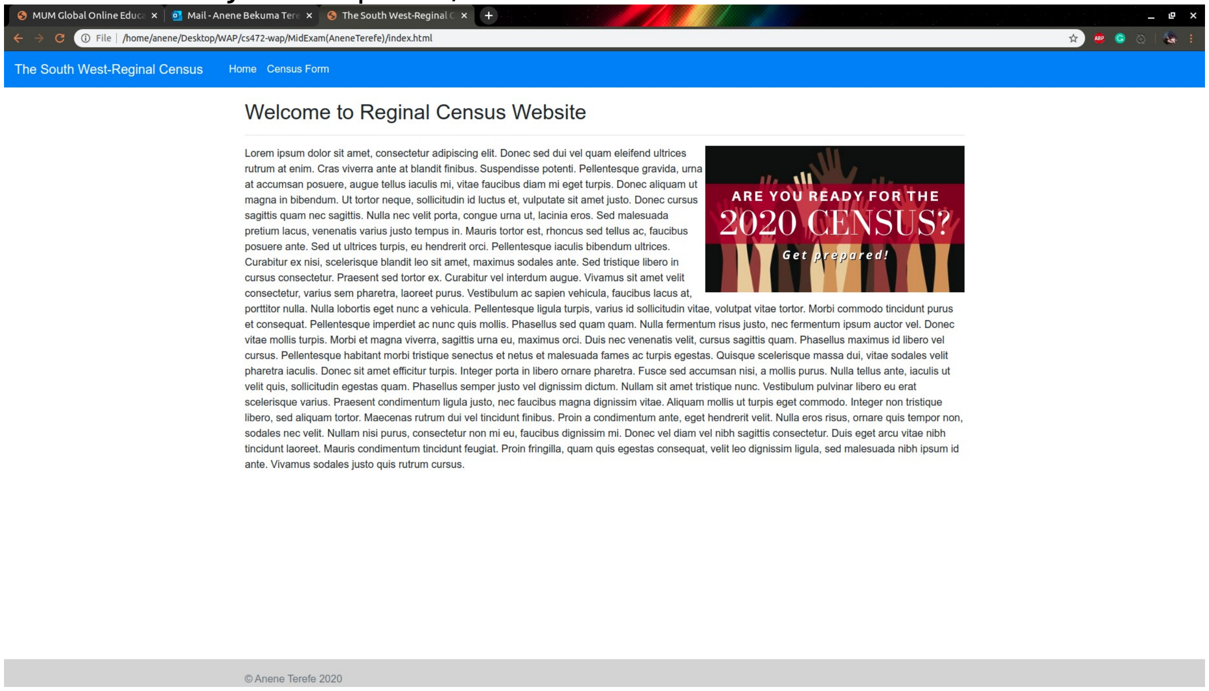
1.6. Using JQuery and/or plain-vanilla JavaScript and DOM API, implement code to submit the 2 sample citizens' data given below, and also display/append the submitted data in a table at the bottom of the census form, as shown in the screenshot above. The user should be able to submit many citizens' data and see them listed on the webpage.

Sample Citizens' Data for submission to test/demonstrate your webapp:

Citizen 1:
- Citizen ID: 1234567890,
- Social Security Number: 123-45-6789,
- Full Name: Anna H. Smith,
- State: New Mexico,
- Senior Citizen: Yes

Citizen 2:
- Citizen ID: 1234567891,
- Social Security Number: 123-45-6788,
- Full Name: Bob J. Harrison,
- State: Arizona,
- Senior Citizen: No

(**Please note:** Points will be awarded based on your adherence to Web programming recommended best practices such as use of standards-compliant, semantically-correct HTML5 markup, unobtrusive CSS, unobtrusive JavaScript etc).



Welcome to Reginal Census Website

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec sed dui vel quam eleifend ultrices rutrum at enim. Cras viverra ante at blandit finibus. Suspendisse potenti. Pellentesque gravida, urna at accumsan posuere, augue tellus iaculis mi, vitae faucibus diam mi eget turpis. Donec aliquam ut magna in bibendum. Ut tortor neque, sollicitudin id luctus et, vulputate sit amet justo. Donec cursus sagittis quam nec sagittis. Nulla nec velit porta, congue urna ut, lacinia eros. Sed malesuada pretium lacus, venenatis varius justo tempus in. Mauris tortor est, rhoncus sed tellus ac, faucibus posuere ante. Sed ut ultrices turpis, eu hendrerit orci. Pellentesque iaculis bibendum ultrices. Curabitur ex nisi, scelerisque blandit leo sit amet, maximus sodales ante. Sed tristique libero in cursus consectetur. Praesent sed tortor ex. Curabitur vel interdum augue. Vivamus sit amet velit consectetur, varius sem pharetra, laoreet purus. Vestibulum ac sapien vehicula, faucibus lacus at, porttitor nulla. Nulla lobortis eget nunc a vehicula. Pellentesque ligula turpis, varius id sollicitudin vitae, volutpat vitae tortor. Morbi commodo tincidunt purus et consequat. Pellentesque imperdiet ac nunc quis mollis. Phasellus sed quam quam. Nulla fermentum risus justo, nec fermentum ipsum auctor vel. Donec vitae mollis turpis. Morbi et magna viverra, sagittis urna eu, maximus orci. Duis nec venenatis velit, cursus sagittis quam. Phasellus maximus id libero vel cursus. Pellentesque habitant morbi tristique senectus et netus et malesuada fames ac turpis egestas. Quisque scelerisque massa dui, vitae sodales velit pharetra iaculis. Donec sit amet efficitur turpis. Integer porta in libero ornare pharetra. Fusce sed accumsan nisi, a mollis purus. Nulla tellus ante, iaculis ut velit quis, sollicitudin egestas quam. Phasellus semper justo vel dignissim dictum. Nullam sit amet tristique nunc. Vestibulum pulvinar libero eu erat scelerisque varius. Praesent condimentum ligula justo, nec faucibus magna dignissim vitae. Aliquam mollis ut turpis eget commodo. Integer non tristique libero, sed aliquam tortor. Maecenas rutrum dui vel tincidunt finibus. Proin a condimentum ante, eget hendrerit velit. Nulla eros risus, ornare quis tempor non, sodales nec velit. Nullam nisi purus, consectetur non mi eu, faucibus dignissim mi. Donec vel diam vel nibh sagittis consectetur. Duis eget arcu vitae nibh tincidunt laoreet. Mauris condimentum tincidunt feugiat. Proin fringilla, quam quis egestas consequat, velit leo dignissim ligula, sed malesuada nibh ipsum id ante. Vivamus sodales justo quis rutrum cursus.

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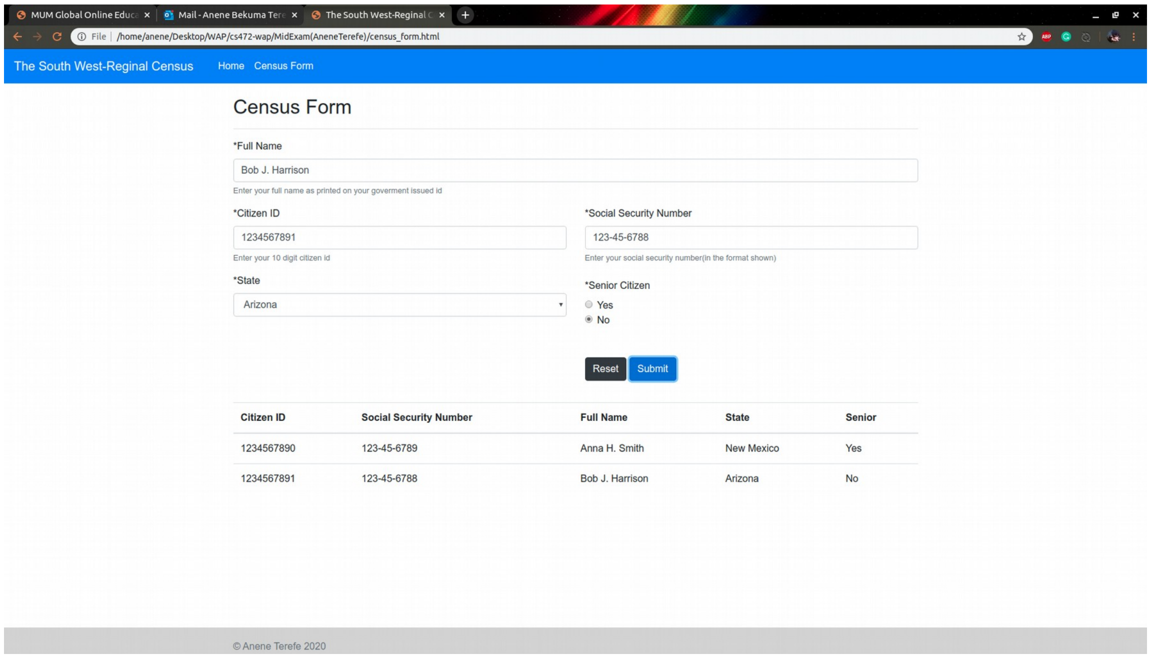
MUM Global Online Educa
Mail - Anene Bekuma Tere
The South West-Reginal C
File | /home/anene/Desktop/WAP/cs472-wap/MidExam(AneneTerefe)/census_form.html
The South West-Reginal Census
Home
Census Form
Reset
Submit

Census Form

*Full Name

Bob J. Harrison

Enter your full name as printed on your goverment issued id

*Citizen ID

1234567891

Enter your 10 digit citizen id

*Social Security Number

123-45-6788

Enter your social security number(in the format shown)

*State

Arizona

*Senior Citizen

Yes [✓ No]

Citizen ID	Social Security Number	Full Name	State	Senior
1234567890	123-45-6789	Anna H. Smith	New Mexico	Yes
1234567891	123-45-6788	Bob J. Harrison	Arizona	No

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2. (6 points) **Implementing JavaScript objects and Inheritance** – RedHondaAccord IS-A Car:

   2.1. (3 points)
   Define a base object named, Car, as JavaScript object literal, with the following three properties:

   make - set its initial value as 'default'
   model - set its initial value as 'default'
   color - set its initial value as 'default'

   and include the following two methods:

   drive - takes a parameter named, speed, and prints-out the following message to
   the console – "The [color] [make] [model] is driving at [speed] mph.

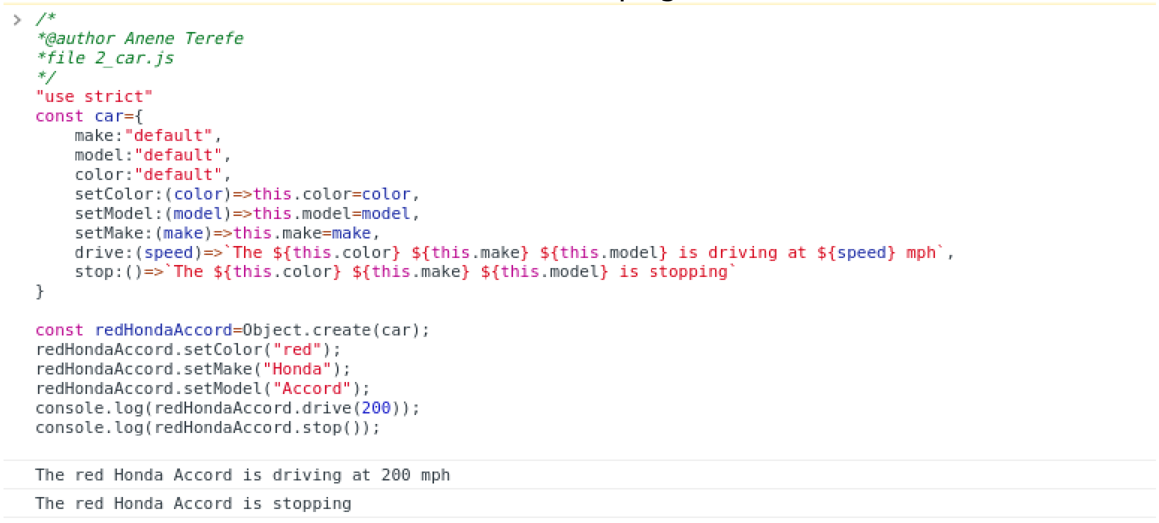
   stop - prints-out the following message to the console – "The [color] [make] [model] is stopping.

   Using inheritance, create a derived object named, **redHondaAccord**, which inherits the properties and methods from the Car object (**Note**: Use Object.create(…) method).

   Assign the values, 'red', 'Honda' and 'Accord' to the respective properties of color, make, and model of the RedHondaAccord object.

Invoke the drive(…) method on the RedHondaAccord object, passing it a speed value of 200.

Open the Web browser console and take a screenshot of your result and save it to a filenamed, P2Q2-1.png.



```
> /*
  *@author Anene Terefe
  *file 2_car.js
  */
  "use strict"
  const car={
      make:"default",
      model:"default",
      color:"default",
      setColor:(color)=>this.color=color,
      setModel:(model)=>this.model=model,
      setMake:(make)=>this.make=make,
      drive:(speed)=>`The ${this.color} ${this.make} ${this.model} is driving at ${speed} mph`,
      stop:()=>`The ${this.color} ${this.make} ${this.model} is stopping`
  }

  const redHondaAccord=Object.create(car);
  redHondaAccord.setColor("red");
  redHondaAccord.setMake("Honda");
  redHondaAccord.setModel("Accord");
  console.log(redHondaAccord.drive(200));
  console.log(redHondaAccord.stop());

  The red Honda Accord is driving at 200 mph

  The red Honda Accord is stopping
```

2.2. (3 points)

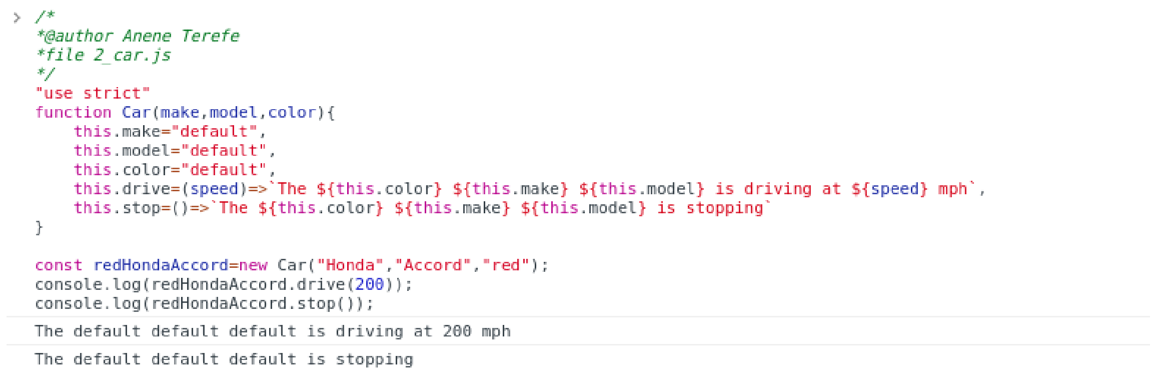
Re-implement the above described inheritance structure, but this time, using a Constructor function. i.e. define a constructor function named Car, with the properties - make, model and color.

Then add to it, the drive(…) method and the stop() method.

Next, based on your Constructor function, create a derived object named RedHondaAccord, with the values, ‘red’, ‘Honda’ and ‘Accord’ for color, make and model, respectively.

Finally, invoke the RedHondaAccord object’s drive(…) method, passing in the value of speed, 300.

Open the Web browser console and take a screenshot of your result and save it to a filenamed, P2Q2-2.png.



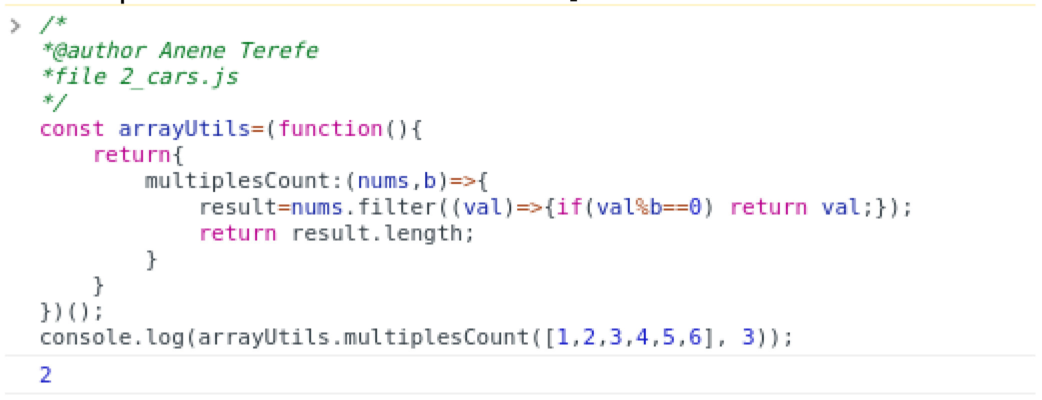
```
> /*
  *@author Anene Terefe
  *file 2_car.js
  */
  "use strict"
  function Car(make,model,color){
      this.make="default",
      this.model="default",
      this.color="default",
      this.drive=(speed)=>`The ${this.color} ${this.make} ${this.model} is driving at ${speed} mph`,
      this.stop=()=>`The ${this.color} ${this.make} ${this.model} is stopping`
  }

  const redHondaAccord=new Car("Honda","Accord","red");
  console.log(redHondaAccord.drive(200));
  console.log(redHondaAccord.stop());
  The default default default is driving at 200 mph
  The default default default is stopping
```

3. (6 points)
   By applying the Modules Pattern, implement code for a module named, arrayUtils.
   In your arrayUtils module, implement the following 2 utility functions:

   3.1 Function named, **multiplesCount**, that takes as input, an array of numbers, **nums**, and a base number, **b**, and returns how many of those numbers contained in the array, nums, are multiples of b.

   For example:
      multiplesCount([1,2,3,4,5,6], 3) should return 2;
      multiplesCount([1,2,3,4,5,6,7,8,9,10,11,12,13,14,15], 5) should return 3;
   and so on.

   Implement this **multiplesCount** function using JavaScript functional programming style and arrow functions, only. So, no use of 'for…loop' or 'while…loop' or 'if' statements allowed].



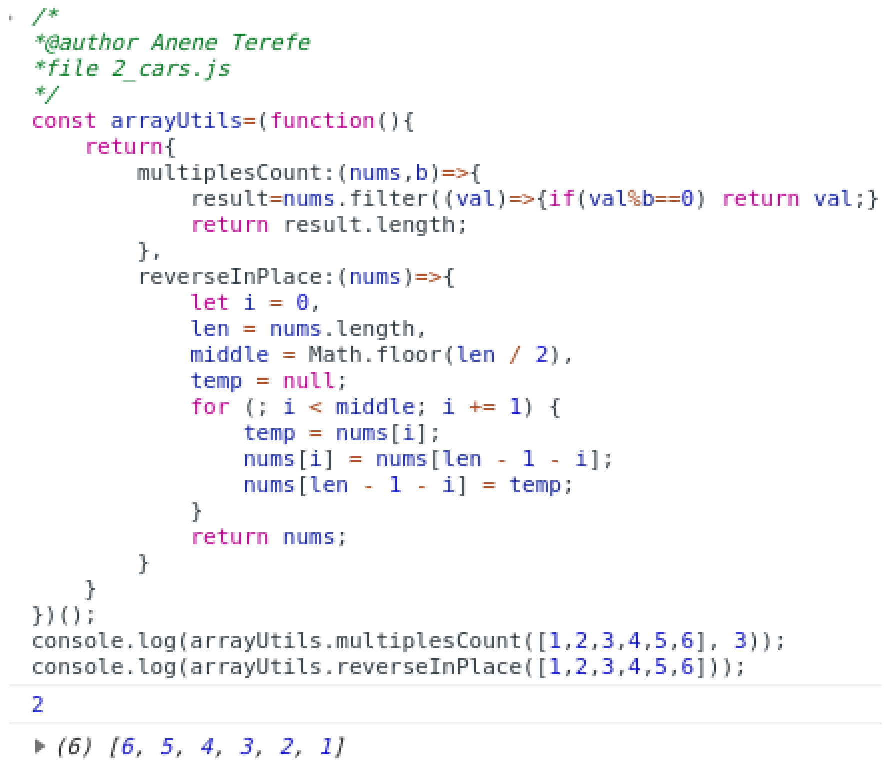
```
> /*
  *@author Anene Terefe
  *file 2_cars.js
  */
  const arrayUtils=(function(){
      return{
          multiplesCount:(nums,b)=>{
              result=nums.filter((val)=>{if(val%b==0) return val;});
              return result.length;
          }
      }
  })();
  console.log(arrayUtils.multiplesCount([1,2,3,4,5,6], 3));
  2
```

3.2

   Function named, **reverseInPlace,** that takes as input an array of numbers, nums, and it reverses the order of the elements in the array, in-place, without declaring/creating a new empty array and pushing the elements into it, in reverse order.

   For example:

reverseInPlace ([1,2,3,4,5,6]) should return [6,5,4,3,2,1];

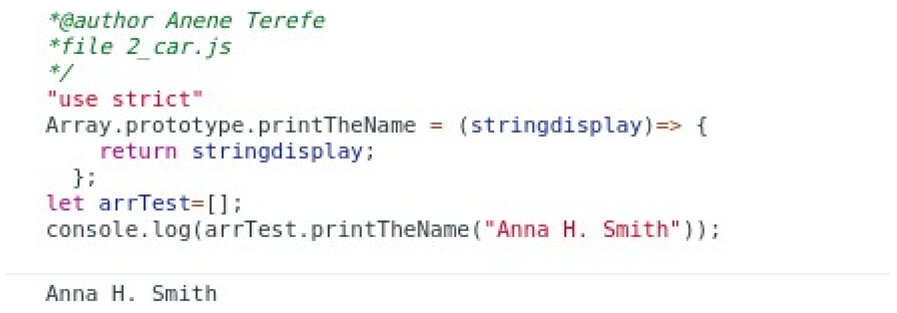


```
/*
*@author Anene Terefe
*file 2_cars.js
*/
const arrayUtils=(function(){
    return{
        multiplesCount:(nums,b)=>{
            result=nums.filter((val)=>{if(val%b==0) return val;}
            return result.length;
        },
        reverseInPlace:(nums)=>{
            let i = 0,
            len = nums.length,
            middle = Math.floor(len / 2),
            temp = null;
            for (; i < middle; i += 1) {
                temp = nums[i];
                nums[i] = nums[len - 1 - i];
                nums[len - 1 - i] = temp;
            }
            return nums;
        }
    }
})();
console.log(arrayUtils.multiplesCount([1,2,3,4,5,6], 3));
console.log(arrayUtils.reverseInPlace([1,2,3,4,5,6]));
```

```
2
▶ (6) [6, 5, 4, 3, 2, 1]
```

4. (3 points) Implement code to add a new method named, printTheName, to the JavaScript Array object. The printTheName method should take as input parameter, a string representing a name and it simply prints-out the name to the console.

   For example:
   const array = [];
   array.printTheName("Anna H. Smith") should print the name, "Anna H. Smith" to the console.
   array.printTheName("Bob J. Harrison") should print the name, "Bob J. Harrison" to the console; and so on.



```
*@author Anene Terefe
*file 2_car.js
*/
"use strict"
Array.prototype.printTheName = (stringdisplay)=> {
    return stringdisplay;
  };
let arrTest=[];
console.log(arrTest.printTheName("Anna H. Smith"));
```

```
Anna H. Smith
```

//-- The End --//