Create a Matlab script that answers each of the following questions and turn it in using the dropbox on Blackboard (blackboard.vanderbilt.edu). You can answer all of these problems within one Matlab script.

Please make sure you comment your code. Please copy or paraphrase the question text as a comment within your code so that I know which part of your script is answering which part of each question on the homework assignment. Make sure you delineate sections of your code with the %% separator.

In this and future homework assignments, if I ask you to comment on how a piece of code functions or ask you why it does or not do something expected, you can answer that question within a comment within your Matlab code. Only for longer expositions might you want to include a text file along with your Matlab code when you turn in an assignment.

For this assignment, please do not use for loops, if/then/else statements, or other Matlab programming constructions we have not yet discussed in class.

Q1. Further research the colon (:) operator and create an array of even numbers between 1 and 100. Try to do the same thing using the linspace command in Matlab.

What is the primary difference between the : operator and the linspace command - under what conditions might you use one vs. the other?

Q2. For this question, I want you to manipulate some brain imaging data.

First, you need to load the data. You'll need to download the brain.mat file from the web site. To load it, all you need to do is execute this command:

```matlab
>> load brain.mat
```

This file contains a 3D structural MR image of a human brain as a three-dimensional Matlab array. You should be able to figure out for yourself the name of that array is (in fact, figuring that out is a necessary component of this assignment).

a) Your first part of this assignment is to write a snippet of code to display one axial slice, one coronal slice, and one sagittal slice from somewhere in the middle of the brain. You don’t need to know anatomy to know what the “middle” looks like, you just need to know how big the array is. Figure it out.

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Axial slice  slicing from the top of the head to the bottom of the head
Coronal slice  slicing from the front of the head to the back of the head
Sagittal slice  slicing from the left of the head to the right of the head

You can display a 2D slice using the `imagesc` command. Read the doc file in Matlab to see what the `imagesc` command does. In its most basic form, it takes a 2D array of data and makes a figure of it.

For example, suppose our array was defined and then displayed using this:

```matlab
>> x = repmat([1:2 ; 3:4], 10, 10)
>> imagesc(x)
```

Use `imagesc` to display an axial, coronal, and sagittal slice (from the middle of the brain). Remember that `imagesc` only takes a 2D array as input. So you might need to think about that when making the function work correctly.

Make sure that when the images are displayed, they are oriented properly; in other words, that the bottom of the brain is toward the bottom of the displayed image. There may be several ways to do this in Matlab, including a built-in function `rot90()`.

b) Modify the code above to display only a central 100x100 portion of an axial, coronal, and sagittal slice.

Your code must be written so that the size of the middle portion to be displayed is a variable that can be set to any other value (100x100), (50x50), (30x30). In other words, I do not want to see things hard-coded based on the specific central portion size or the image data size.

c) There are multiple functions to display images in Matlab. Another is the `image()` command. Read the doc file in Matlab to see how `image` differs from `imagesc`. Write some
code using image to see the difference. In 1-2 sentences, how do you think `image` differs from `imagesc`?

HINT: You might need to use the `squeeze()` command to display some of the images.

*Unexcused late assignments will be penalized 10% for every 24 hours late, starting from the time class ends, for a maximum of two days, after which they will earn a 0.*