CSC781M

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MSCS

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Exercise 2: Octave Programming Exercises

To demonstrate your mastery of basic Octave programming, please accomplish the ff. programming tasks

(note: create a suitable m-file for this, and always accompany with PDF documentation explaining how you designed your code, and it should also contain results of sample runs. In your m-file, always place authorship information, instructions for running your m-file, and explanations of key sections of your codes AS COMMENTS. Place your m-file and documentation in a zip-file named as lastName_firstName.zip and upload to the assignment submission page).

MP1: Generating signals and plotting them.

Instructions:

1. Generate a series of values starting from -100 to 100, in increments of 4. Name it as variable x.
2. Create a new variable y with all of the elements reversed.
3. Perform element-by-element multiplication of x and y (also called the Hadamard product of x and y). Name it as variable z.
4. Plot x, y, and z with graph on top of the other.

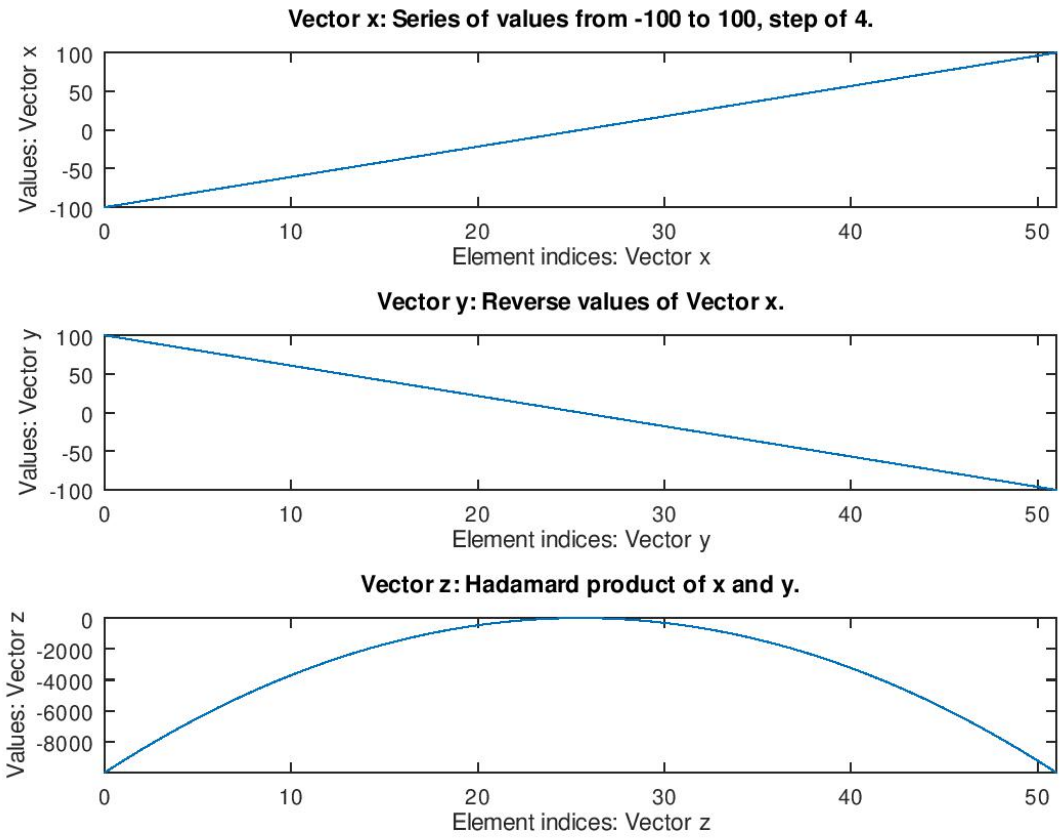
Program Type: **Source file**
m-file: **signalplot.m**

Running *signalplot.m*:

> Execute signalplot in octave gui or cli:
> $ octave

```
octave:1> signalplot
```

> Figure 1.0: Plotting signals produced for vectors x, y, and z.



MP2: Plotting functions and finding the absolute maximum and absolute minimum in Octave.

Instructions:

1. Plot the function $y(x) = x^3 - 5x^2 - 4x + 20$ for values of x ranging from -5 to 5, in increments of 0.5.
2. From the graph, what are the values of x where the maximum, minimum and zeros of the function $y(x)$ occur?
3. Automatically determine the zeros of $y(x)$.

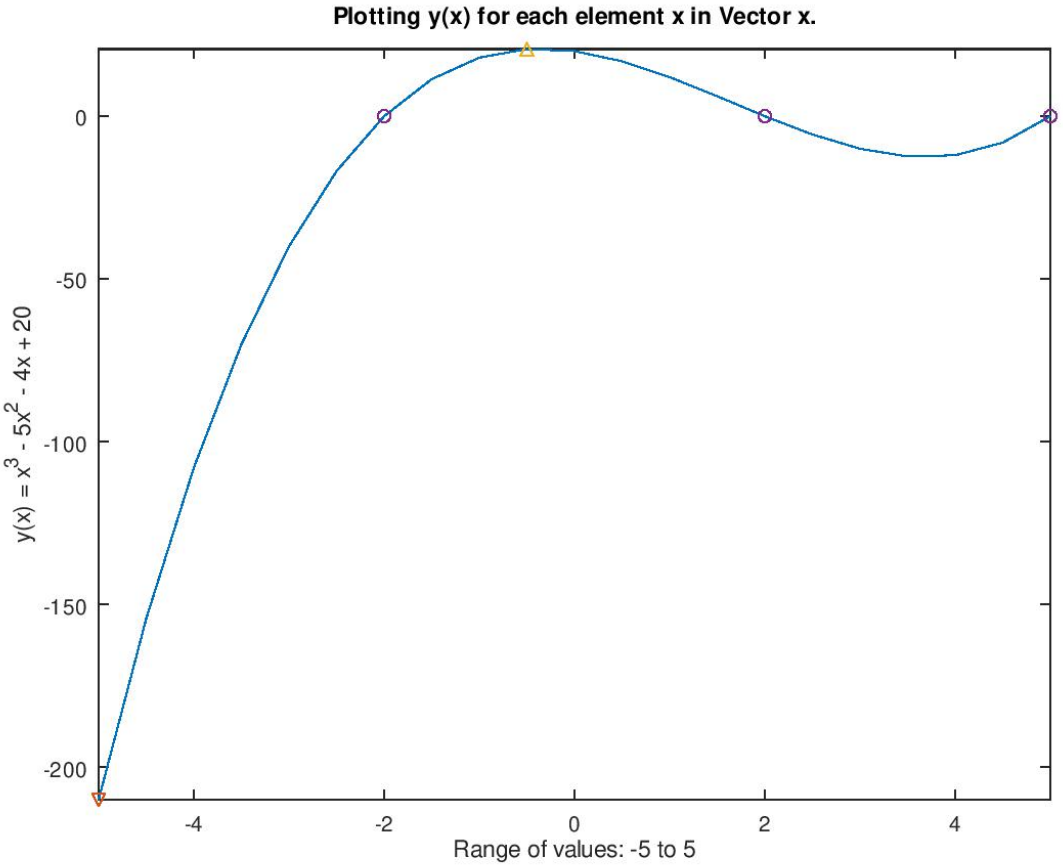
Program Type: **Source file**
m-file: **functionplot.m**

Running *functionplot.m*:

> Execute signalplot in octave gui or cli:
> $ octave

```
octave:1> functionplot
```

> Figure 2.0: Function $y(x)$, with zeros, min, and max marked.



Discussion:

> - The minimum value of $y(x)$ is marked with a downward facing red-triangle.
> - The maximum value of $y(x)$ is marked with an upward facing yellow triangle.
> - Occurrences of zeroes are detected and marked with a purple circle.

MP3: Fibonacci Series:

Instructions:

1. Take a numeric value N, then return the first N elements.

Program Type: **Function file**
m-file: **functionplot.m**

Running *functionplot.m*:

> Execute signalplot in octave gui or cli:
> $ octave

```
octave:1> fibonacci 10
octave:2> fibonacci =
                  0 1 1 2 3 5 8 13 21 34
```

Implementation: **Dynamic programming**

> Each element computed are memoized instead of being recomputed recursively.
> Time-complexity: **O(n)**