Math 391

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Week 1: Practice with MatLab

First week is to introduce you to MATLAB, the following exercise will help familiarize yourself with MATLAB. We are going to display a quadratic function for a range of x values. And then calculate the roots. Displaying the roots on the plot.
Then we will look at how to create a function to calculate the roots of a quadratic function.

Exercise outline:

- Create a matlab script
- Generate data for a quadratic function
- Plot the function
- Improve the display
- Compute the roots of the quadratic function
- Write the code to compute the roots as a MATLAB function

0.1 Create a matlab script

Creating a .m script file in matlab will allow you to save your work and run your script or sections of your script.

0.2 Generate data for to plot a quadratic function

Create a set of x values, define a quadratic function. And calculate the y data for that function

Recall a quadratic function is in the form:

$$f(x) = ax^2 + bx + c$$

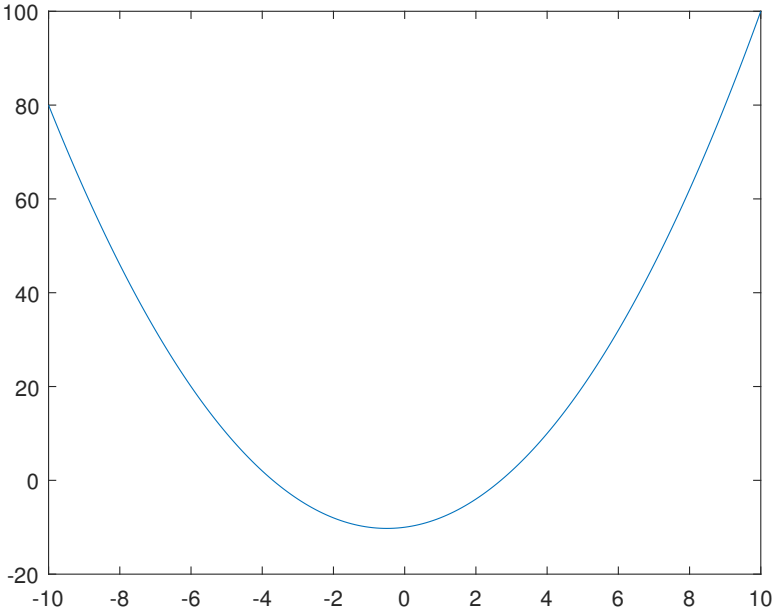
Example of what your variables might be:

```
  Name      Size             Bytes  Class     Attributes

  a         1x1                  8  double
  b         1x1                  8  double
  c         1x1                  8  double
  x         1x201             1608  double
  y         1x201             1608  double
```

0.3 Plot function

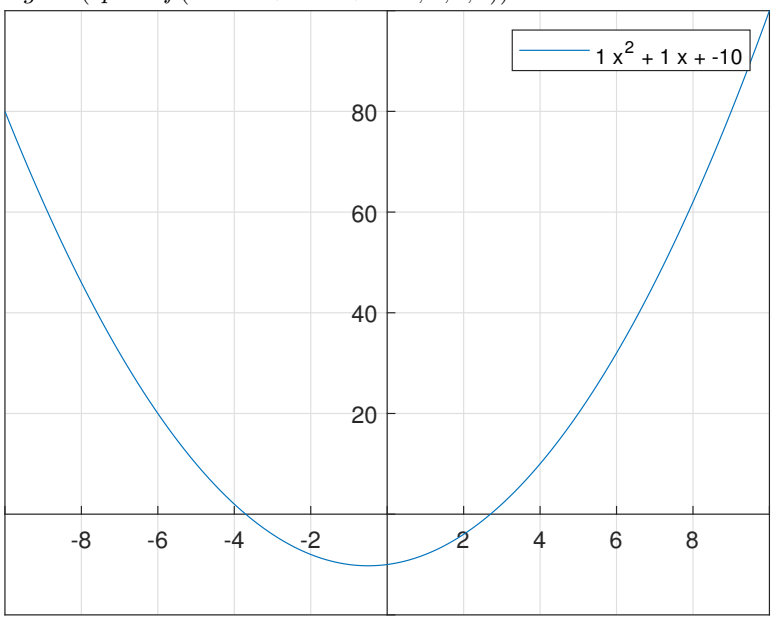
Plot the data you created in the section above.



0.4 Improve the plot display

Various settings can be changed on the plot to make a plot easier to understand and read.

grid on
ax=gca;
ax.XAxisLocation = 'origin';
ax.YAxisLocation = 'origin';
$legend(sprintf("\%ix^2 + \%ix + \%i", a, b, c))$

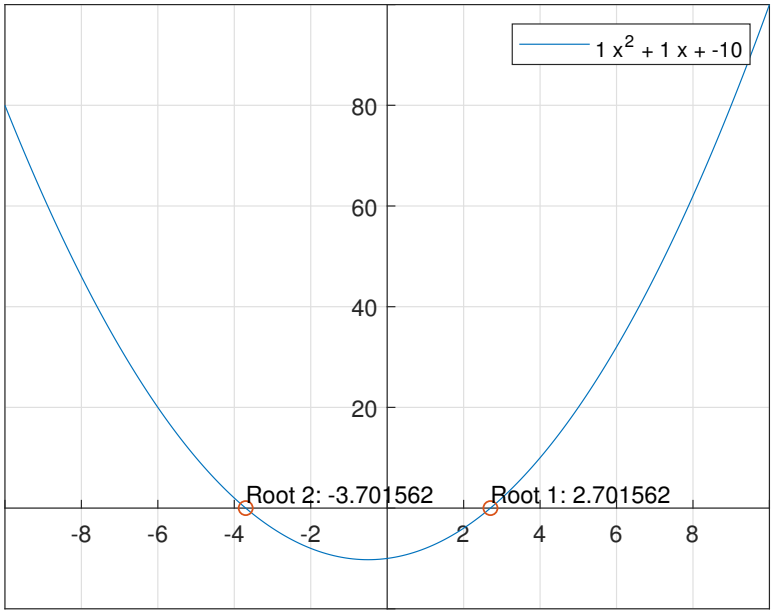


0.5 Compute the roots of the quadratic function

Only compute the positive roots (real numbers) and return no roots if the root is not real.

```
r =

    2.7016   -3.7016
```



0.6 Write the code to compute the roots as a MATLAB function

Often we will write code that we will want to call multiple times. Being able to write it as a function permits us to call function

Tip: In MATLAB, functions must be at the end of the script file.

```
r2=findroots(a,b,c)

r2 =

    2.7016   -3.7016
```