

Practice with MatLab

First week is to introduce you to MATLAB, the following exercise will help familize yourself with MATLAB

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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.

Create x,y data for a quadratic function

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

Example of what your variables might be:

```
clear all;
close all;
x=[-10:0.1:10];
a=1;
b=1;
c=2;
y=a*x.^2+b*x+c;

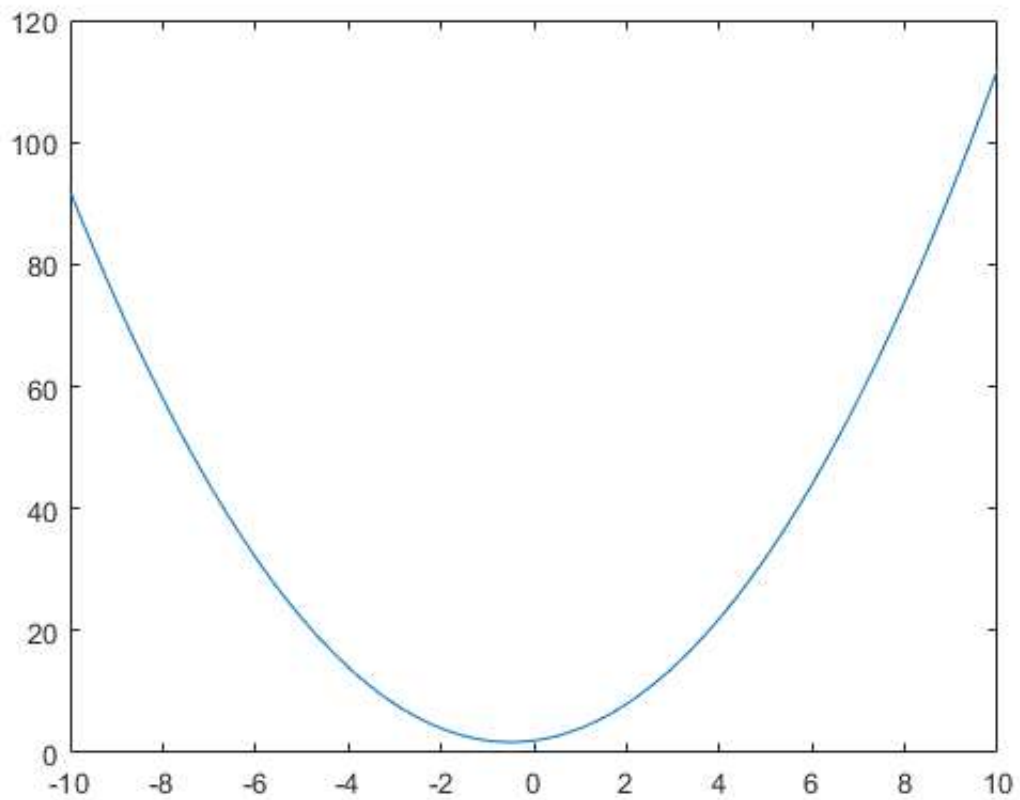
whos
```

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	

Plot function

Plot the data you created in the section above.

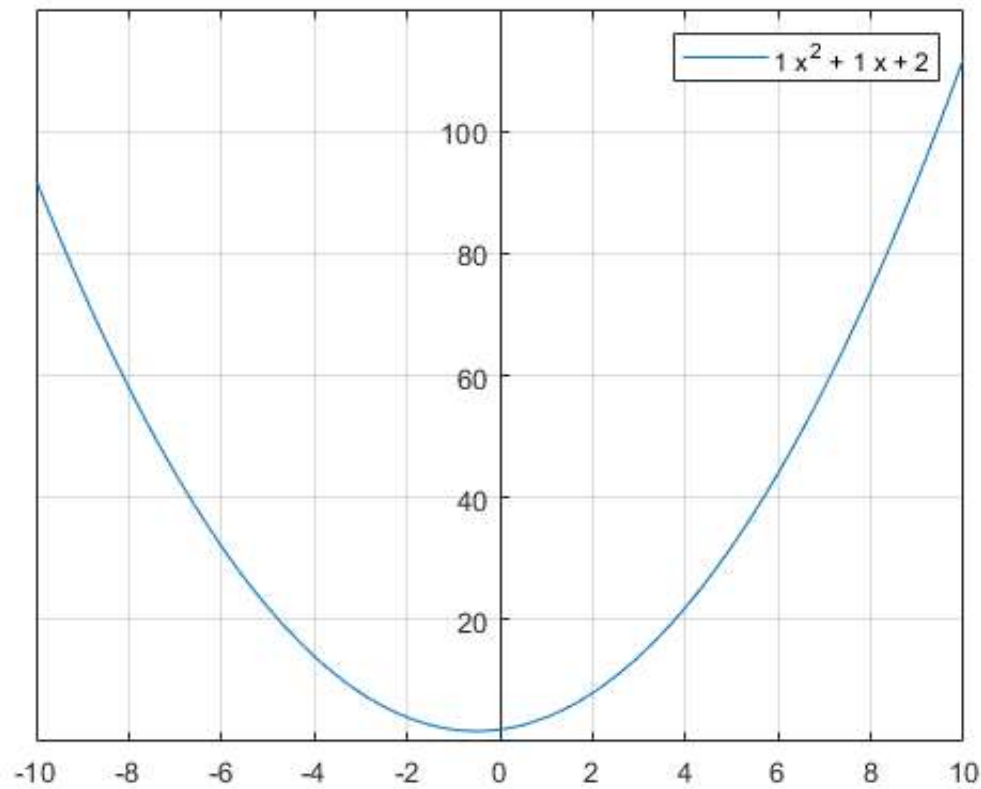
```
plot(x,y);
hold on
```



Improve the plot display

Various settings can be changed on the plot to make a plot easier to understand and read. Hints: `gca` - `getcurrentaxis`

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



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=[];
if b^2-4*a*c > 0
    r(1)=(-b+sqrt(b.^2-4*a*c))/(2*a);
    r(2)=(-b-sqrt(b.^2-4*a*c))/(2*a);
elseif b^2-4*a*c == 0
    r(1)=(-b+sqrt(b.^2-4*a*c))/(2*a);
end
r

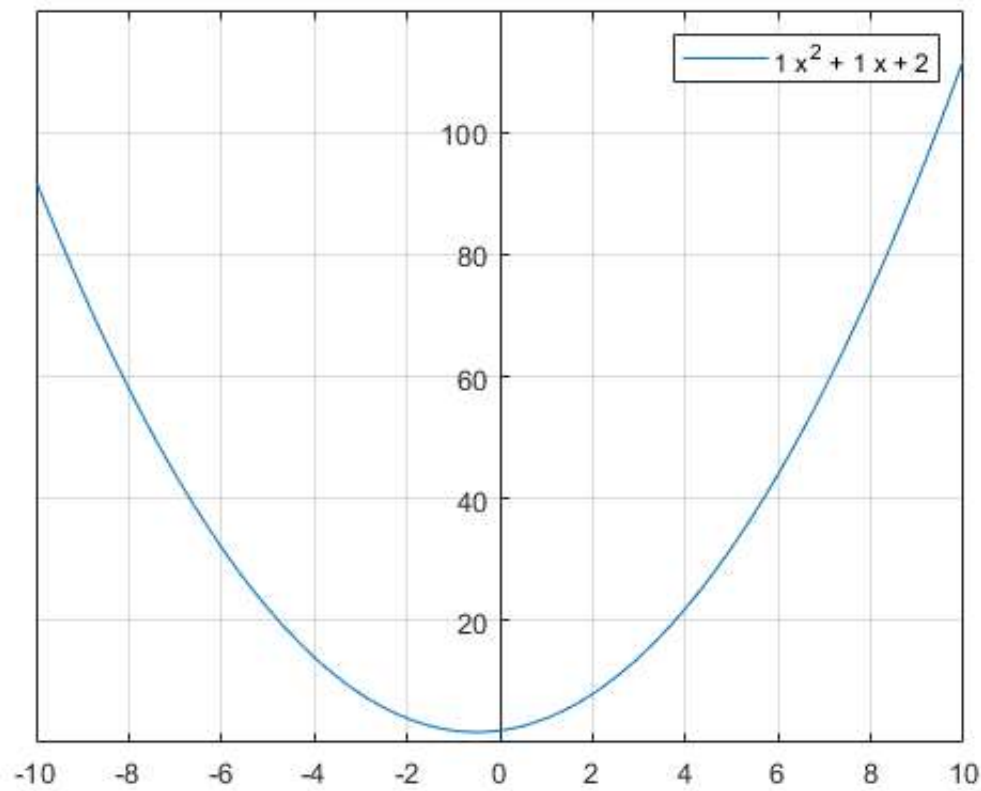
plot(r,r*0,'o')
i=0;
labels=[];
for n = r
    i=i+1;

    labels=[labels, sprintf("Root %i: %f",i,r(i))];
end

text(r,r*0,labels,'VerticalAlignment','bottom','HorizontalAlignment','left')
legend(sprintf("%i x^2 + %i x + %i",a,b,c))
```

r =

[]



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=findroots(a,b,c)

function [r] = findroots(a,b,c)
r=[];
if b^2-4*a*c > 0
    r(1)=(-b+sqrt(b^2-4*a*c))/(2*a);
    r(2)=(-b-sqrt(b^2-4*a*c))/(2*a);
elseif b^2-4*a*c == 0
    r(1)=(-b+sqrt(b^2-4*a*c))/(2*a);
end
end
```

r2 =

[]

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