Plotting Graphs

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Steps to install the package "Plots".(manually)

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2. Launch "julia".
3. In the Julia REPL (Read-Eval-Print Loop), press the ']' key on your keyboard to enter the package manager mode.
4. Once inside the package manager mode, run the following command to add the "Plots" package:

```
import Pkg
Pkg.add("Plots")
```

Now you have successfully set up plotting in Julia. You can use the "Plots" package for creating visualizations.

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Initialize "Plots" package

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```
using Plots
```

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```
PlotlyBackend()
```

```
plotly()
```

This can also be done in a single line.

```
using Plots; plotly()
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Getting into Plots

```
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```

```
x = 1:10
```

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```
y =  [5, 10, 15, 20, 25, 30, 35, 40, 45, 50]
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We are going to plot the linear equation, $y = 5x$

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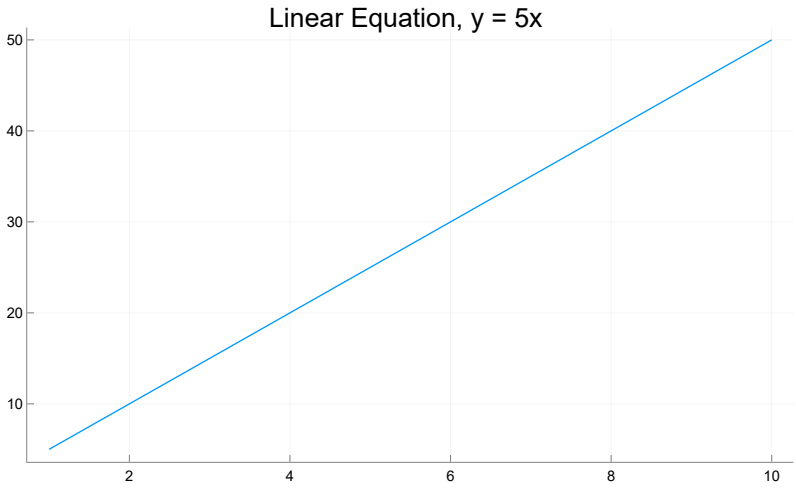


```
plot(x, y, legend=false, title="Linear Equation, y = 5x ")
```

This can also be written in seperate lines,

```
begin
    plot(years, apples)
    plot!(legend=false)
    plot!(title="Number of apples per year")
end
```

Here,

```
 plot!
```

means, that the command is modifying the current plot.

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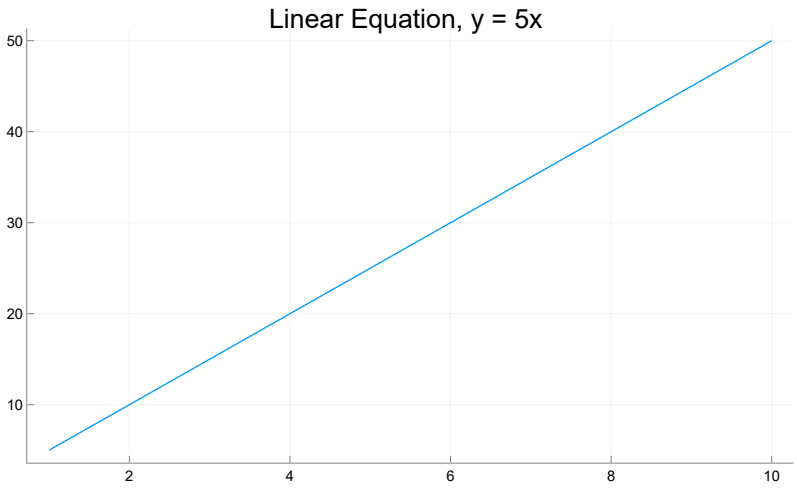


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begin
    plot(x, y)
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As you can see, both gives the same result.

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```
x1 = 1:10
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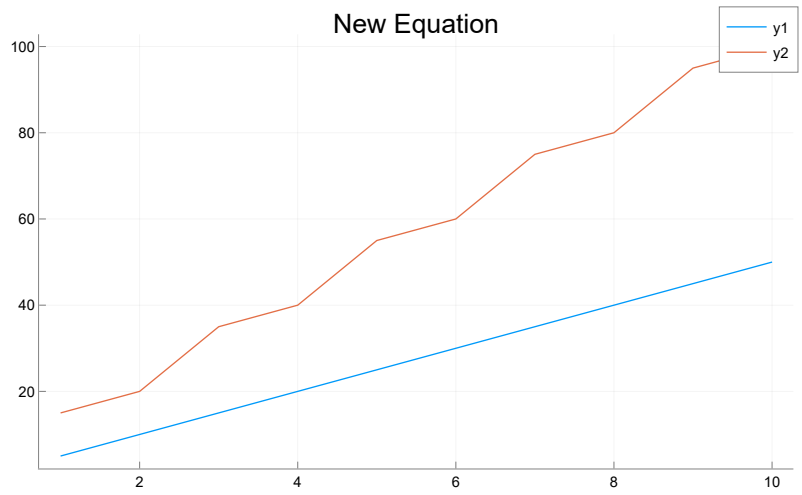
```
y1 =   Int64[
          1:  15
          2:  20
          3:  35
          4:  40
          5:  55
          6:  60
          7:  75
          8:  80
          9:  95
          10:  100
    ]
```

```
y1=[15, 20, 35, 40, 55, 60, 75, 80, 95, 100]
```




```
begin
 plot(x, y, legend=true, title="Linear Equation, y = 5x ")
 plot!(x1,y1, legend=true, title="New Equation")
end
```

There are different types of plotting available to us.

1. Scatter : It will give us a discrete plot of our input.

```
scatter(x, y, legend=true, title="Linear Equation, y = 5x ")
```

2. Linear : It will give us a discrete plot of our input, connected with straight lines.

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plot(x, y, legend=true, title="Linear Equation, y = 5x ")
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Plotting more functions

```
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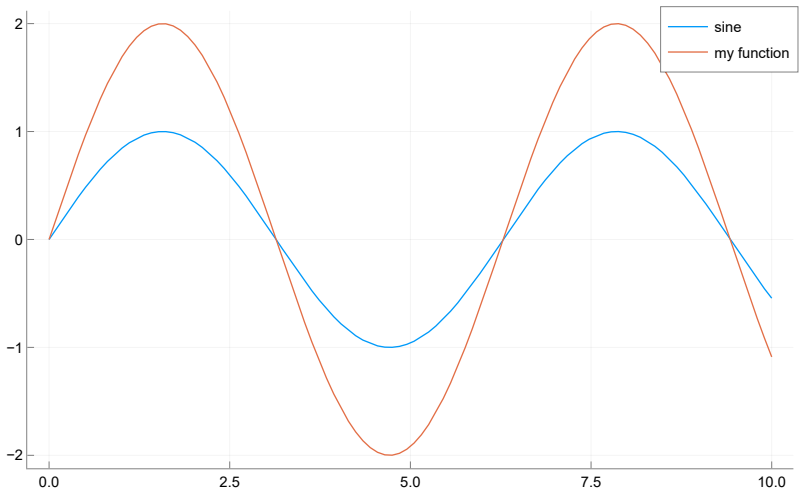
```




```
begin
    x3 = range(0, 10, length=100)
    function equation(x)
        y3 = 2*sin.(x)
        return y3
    end

    plot(x3, sin, label="sine") #graphs sin(x3)
    plot!(x3, equation, label="my function") #graphs 2*sin(x)
end
```

Plotting functions in a different way

```
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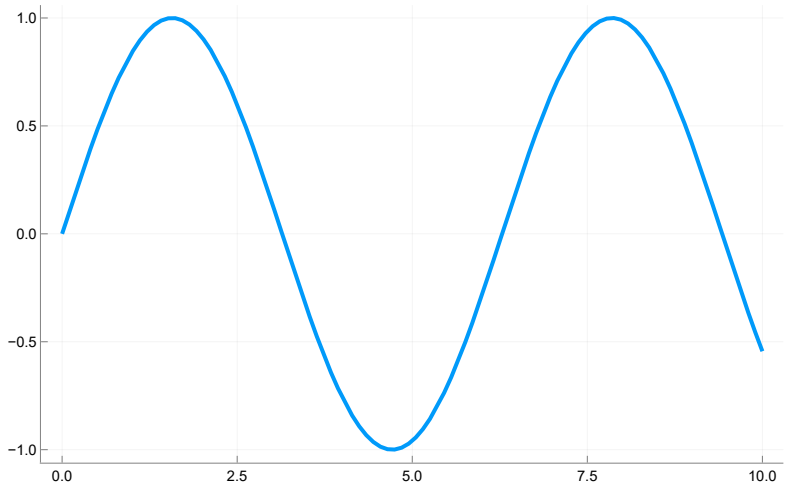


```
begin
 x4 = range(0, 10, length=100)
 y4 = sin.(x4)
 plot(x4, y4, legend=false, linewidth=3)
end
```

In Plots.jl, the structure of your data is key to creating series for plotting. Each column in a matrix represents a series, comprising a set of interconnected data points that are used to generate lines, surfaces, or other graphical elements. This flexibility allows you to visualize multiple lines simultaneously by organizing your data in a matrix, where each column corresponds to an individual line.

For instance, consider a matrix like [y1 y2]. This forms a 100x2 matrix, signifying it contains 100 data points distributed across 2 columns. In this context, each column serves as an independent line or series in your plot, enabling you to visualize and compare multiple series within the same plot.

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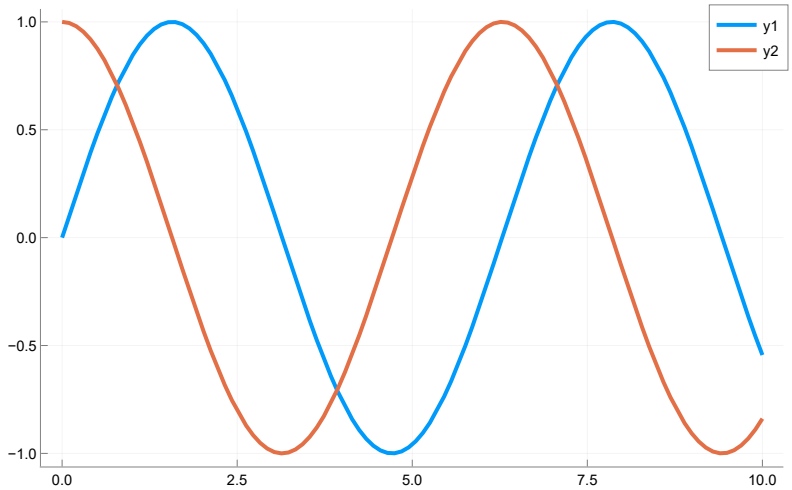


```
begin
 x5 = range(0, 10, length=100)
 y51 = sin.(x5)
 y52 = cos.(x5)
 plot(x5, [y51 y52], linewidth=3, minorgrid=true)
end
```

```
    @.
```

This is a convenience macro that inserts dots for every function call to the right of the macro, ensuring that the entire expression is to be evaluated in an element-wise manner. If we inputted the dots manually, we would need three of them for the sine, exponent, and subtraction, and the resulting code would be less readable.

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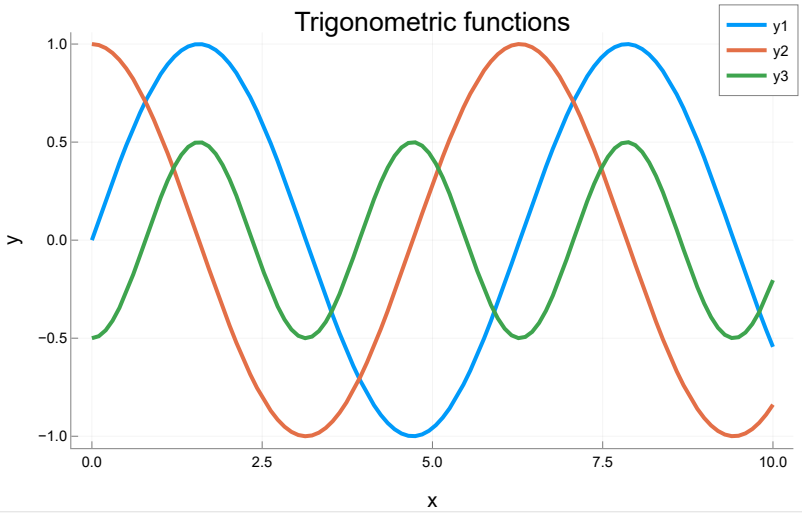


```
begin
 y53 = @. sin(x5)^2 - 1/2  # equivalent to y3 = sin.(x).^2 .- 1/2, the entire
                           # expression is to be evaluated in an element-wise manner.

 plot!(x5, y53, linewidth=3)
 xlabel!("x")
 ylabel!("y")

 title!("Trigonometric functions")
end
```

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