


```
| 4
```

Above, `julia>` is the prompt. These notes will not include the prompt, so that copying-and-pasting can be more easily used. Input and output cells display similarly, though with differences in coloring. For example:

```
| 2 + 2
```

```
4
```

Other interfaces to Julia are described briefly in [Julia interfaces](#). The notebook interface provided through IJulia most closely matches the style of the notes.

1.1 Add-on packages

Julia has well over a 1000 external, add-on packages that enhance the offerings of base Julia. We refer to one, `CalculusWithJulia`, that is designed to accompany these notes. This package installs several other packages that provide the needed functionality. The package (and its dependencies) can be installed through:

```
| using Pkg  
| Pkg.add("CalculusWithJulia")
```

(Or the one liner `] add CalculusWithJulia`. Some additional details on packages is provided [here](#).)

Installation only needs to be done once, but to use a package it must be loaded into each new session. This can be done with this command:

```
| using CalculusWithJulia
```

1.2 The basics of working with IJulia

The **very** basics of the Jupyter notebook interface provided by IJulia are covered here.

An IJulia notebook is made up of cells. Within a cell a collection of commands may be typed (one or more).

When a cell is executed (by the triangle icon or under the Cell menu) the contents of the cell are evaluated by the Julia kernel and any output is displayed below the cell. Typically this is just the output of the last command.

```
| 2 + 2  
| 3 + 3
```

```
6
```

If the last commands are separated by commas, then a "tuple" will be formed and each output will be displayed, separated by commas.

```
| 2 + 2, 3 + 3
```

```
| (4, 6)
```

Comments can be made in a cell. Anything after a # will be ignored.

```
| 2 + 2 # this is a comment, you can ignore me...
```

```
4
```

Graphics are provided by external packages. There is no built-in graphing. We use the `Plots` package and its default backend. The `Plots` package provides a common interface to several different backends, so this choice is easily changed. The `GR` and `plotly` backends are used in these notes, when possible; the `PyPlot` backend is used for some surface plots.

```
| using CalculusWithJulia  
| using Plots
```

With that in hand, to make a graph of a function over a range, we follow this pattern:

```
| plot(sin, 0, 2pi)
```

```
| Plot{Plots.PlotlyBackend() n=1}
```

A few things:

- Cells are numbered in the order they were evaluated.
- This order need not be from top to bottom of the notebook.
- The evaluation of a cell happens within the state of the workspace, which depends on what was evaluated earlier.
- The workspace can be cleared by the "Restart" menu item under "Kernel". After restarting the "Run All" menu item under "Cell" can be used to re-run all the commands in the notebook - from top to bottom. "Run all" will also reload any packages.