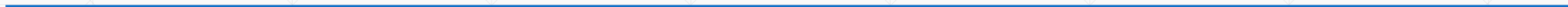
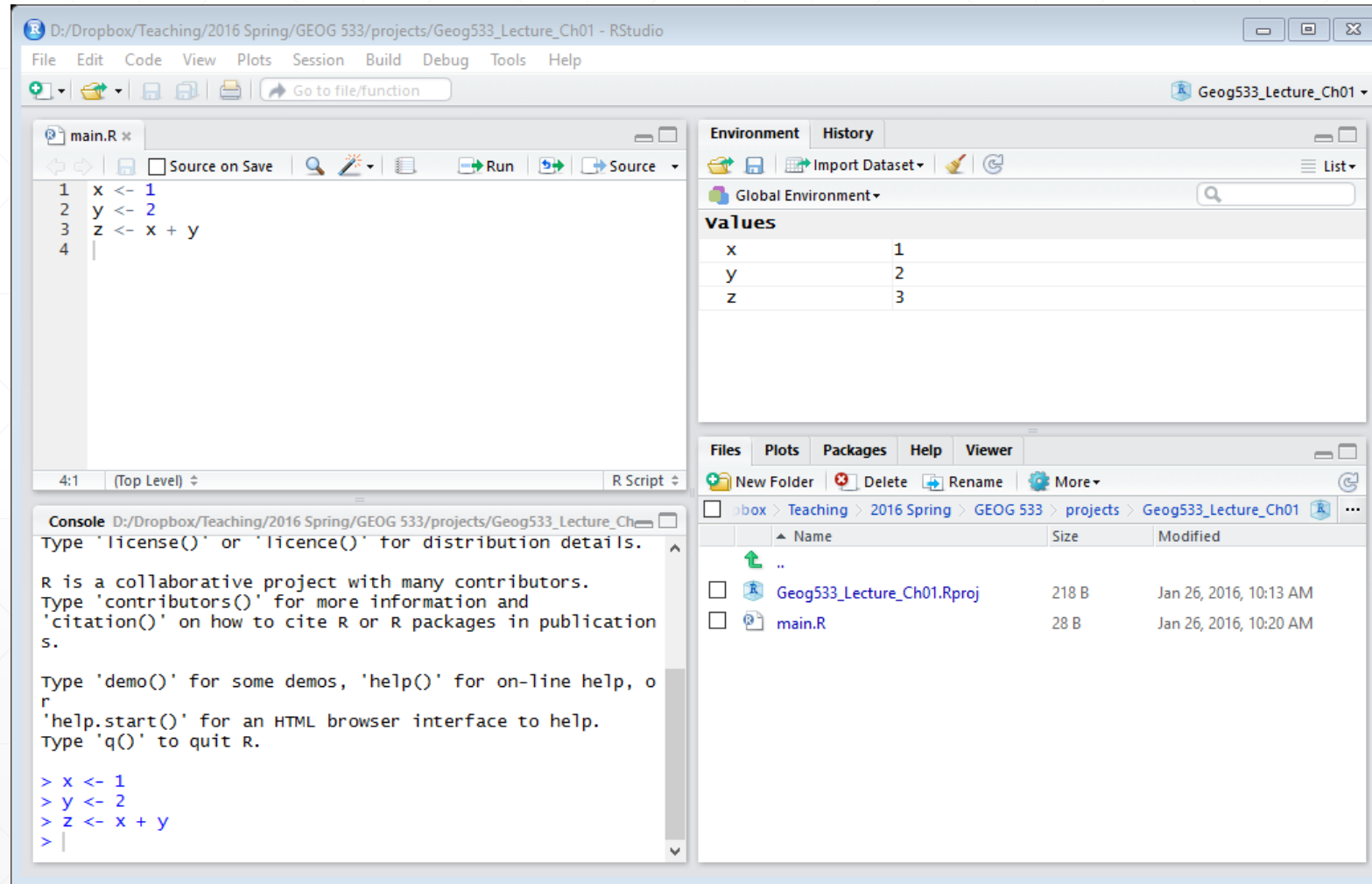


Getting started with RStudio



RStudio Interface



Write Code

Navigate tabs
Open in new window
Save
Find and replace
Compile as notebook
Run selected code

R Support

Import data file with wizard
History of past commands to run/add to source
Display .Rpres slideshows
File > New File > R Presentation

The screenshot shows the RStudio IDE interface with several panels and annotations:

- Source Editor:** Contains R code with annotations for syntax highlighting, tab completion, and multi-cursor selection.
- Environment Panel:** Shows the Global Environment with a list of objects (Data, Values, Functions) and their descriptions.
- Files Panel:** Shows the file browser with a context menu for file operations.
- Console:** Shows the command history and the output of the `foo()` function.

Annotations:

- Write Code:**
 - Navigate tabs
 - Open in new window
 - Save
 - Find and replace
 - Compile as notebook
 - Run selected code
- R Support:**
 - Import data file with wizard
 - History of past commands to run/add to source
 - Display .Rpres slideshows
 - File > New File > R Presentation**
- Source Editor:**
 - Cursors of shared users
 - Re-run previous code
 - Source with or without Echo
 - Show file outline
 - Multiple cursors/column selection with **Alt + mouse drag**.
 - Code diagnostics that appear in the margin. Hover over diagnostic symbols for details.
 - Syntax highlighting based on your file's extension
 - Tab completion to finish function names, file paths, arguments, and more.
 - Multi-language code snippets to quickly use common blocks of code.
 - Jump to function in file
 - Change file type
- Environment Panel:**
 - Load workspace
 - Save workspace
 - Delete all saved objects
 - Search inside environment
 - Choose environment to display from list of parent environments
 - Display objects as list or grid
 - Displays saved objects by type with short description
 - View in data viewer
 - View function source code
- Files Panel:**
 - Create folder
 - Upload file
 - Delete file
 - Rename file
 - Change directory
 - Path to displayed directory
 - A File browser keyed to your working directory. Click on file or directory name to open.
- Console:**
 - Working Directory
 - Maximize, minimize panes
 - Press **↑** to see command history
 - Drag pane boundaries

Environment tab

The Environment tab stores any object, value, function or anything you create during your R session. In the example below, if you click on the dotted squares you can see the data on a screen to the left.

The screenshot displays the RStudio interface. The top pane shows the R script editor with the following code:

```
1 x <- 1
2 y <- 2
3 z <- x + y
4
5 getwd()
6
7 A <- matrix(c(1:8),nrow = 4,ncol = 2)
8 A
9 B <- matrix(c(1:8),nrow = 4, ncol = 2, byrow = TRUE)
10 B
```

The bottom-left pane shows a data preview table:

	V1	V2
1	1	5
2	2	6
3	3	7
4	4	8

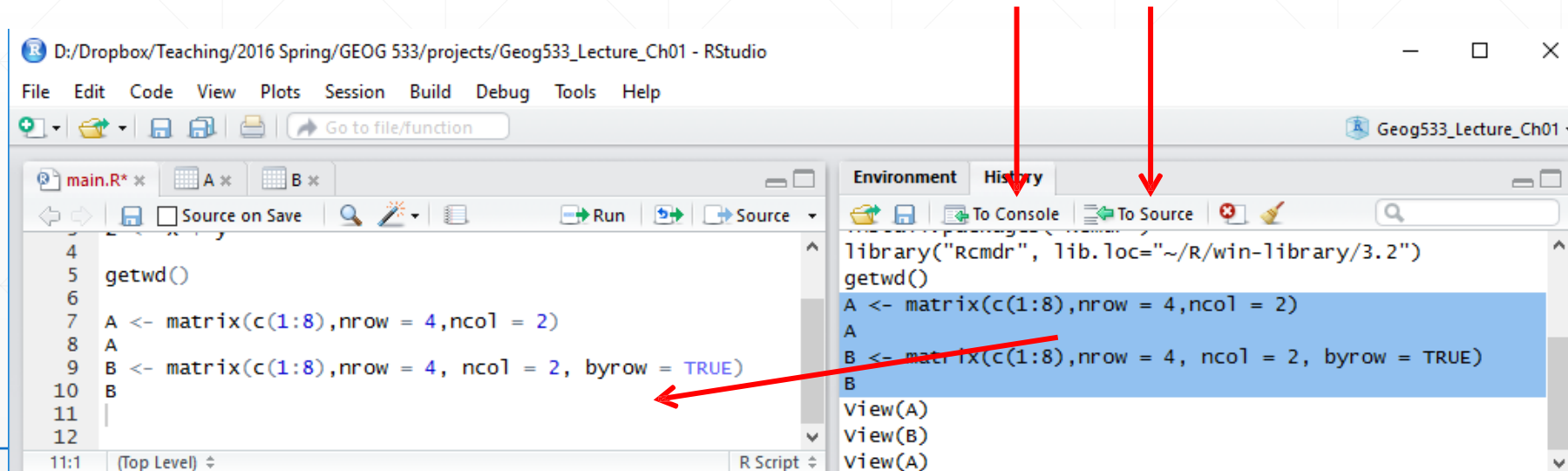
The bottom-right pane shows the Environment tab with the following data:

Global Environment		
Data		
A	int [1:4, 1:2]	1 2 3 4 5 6 7 8
B	int [1:4, 1:2]	1 3 5 7 2 4 6 8
values		
x		1
y		2
z		3

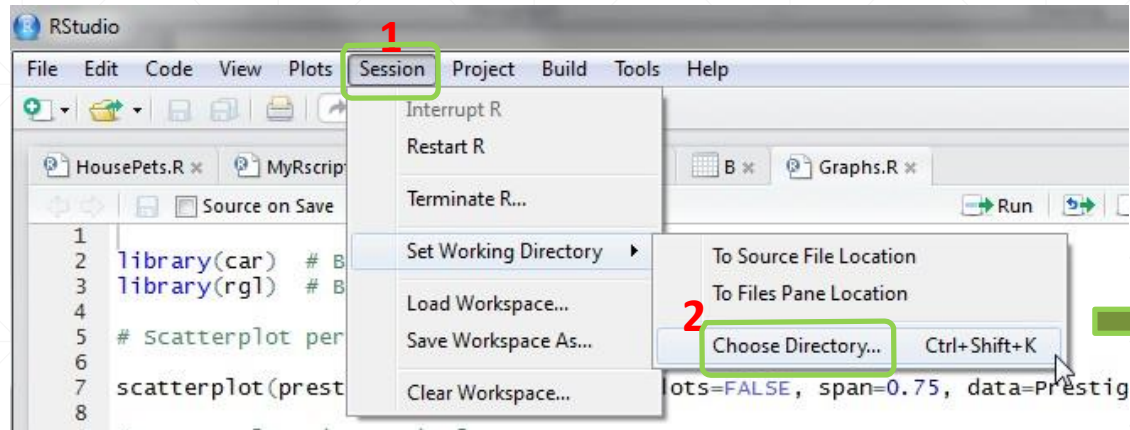
Red arrows indicate the relationship between the code, the Environment tab, and the data preview. One arrow points from the script editor to the Environment tab, and another points from the Environment tab to the data preview table.

History tab

The history tab keeps a record of all previous commands. It helps when testing and running processes. Here you can either **save** the whole list or you can **select** the commands you want and send them to an R script to keep track of your work. In this example, we select all and click on the “To Source” icon, a window on the left will open with the list of commands. Make sure to save the ‘untitled1’ file as an *.R script.



Changing the working directory



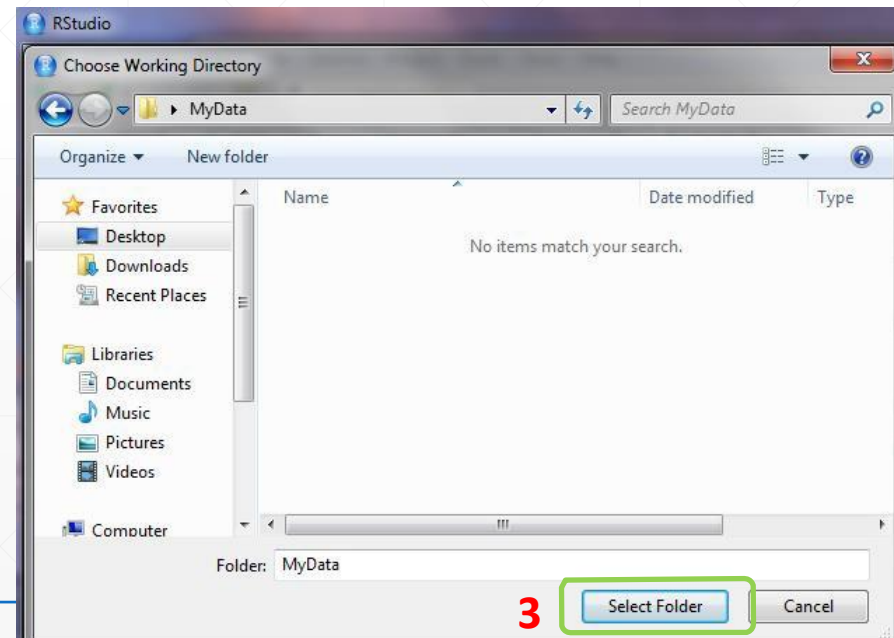
If you have different projects you can change the working directory for that session, see above. Or you can type:

```
# Shows the working directory (wd)
```

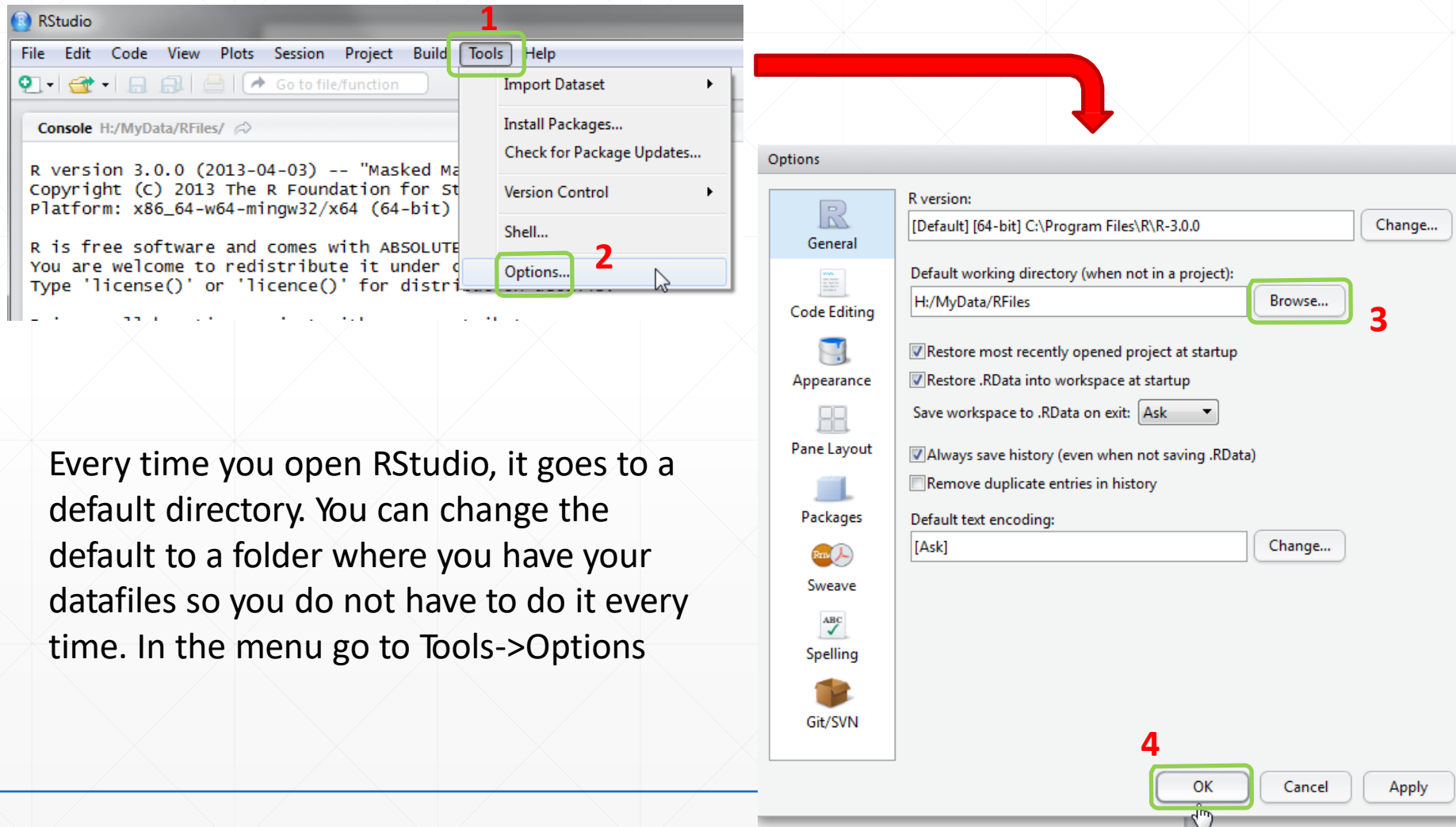
```
getwd()
```

```
# Changes the wd
```

```
setwd("C:/myfolder/data")
```

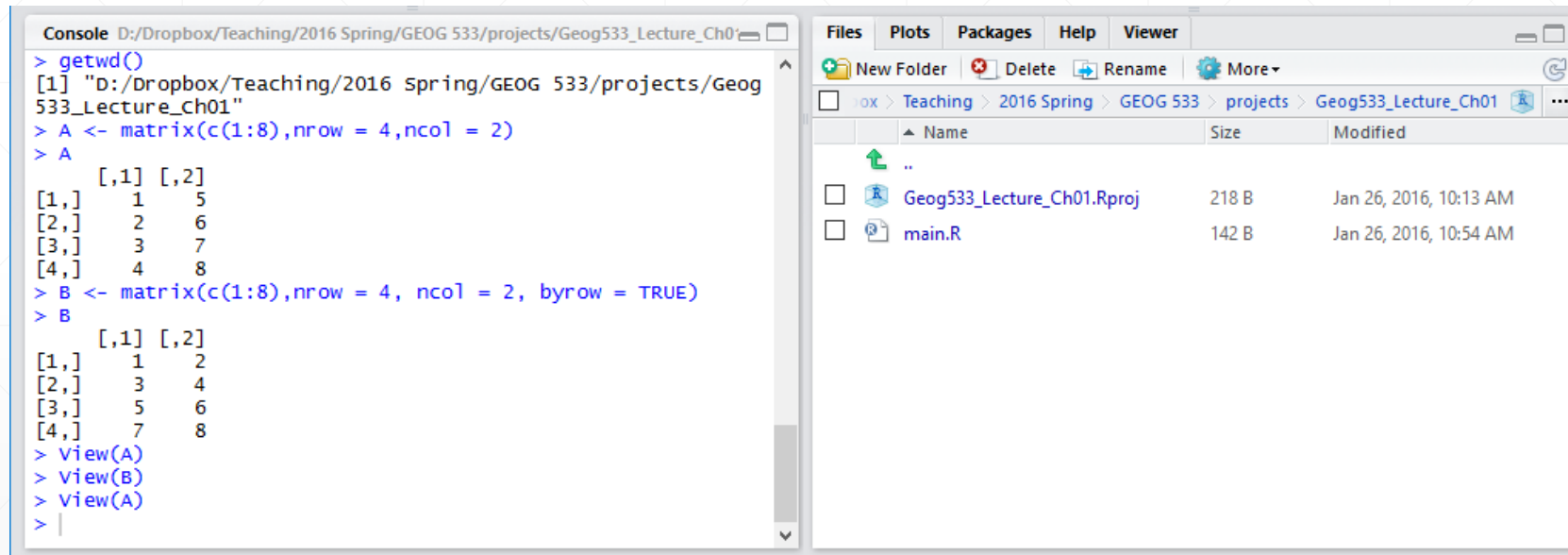


Setting a default working directory



Console tab

Ctrl + *L* to clear the Console



The screenshot displays the RStudio interface with two tabs visible: 'Console' and 'Files'. The 'Console' tab is active, showing a series of R commands and their outputs. The commands include `getwd()`, `matrix()` to create matrices `A` and `B`, and `view()` to display them. The output for `A` is a 4x2 matrix with values 1 through 8. The output for `B` is a 4x2 matrix with values 1 through 8, created with `byrow = TRUE`. The 'Files' tab shows the file explorer for the current project, listing files like `Geog533_Lecture_Ch01.Rproj` and `main.R`.

```
> getwd()
[1] "D:/Dropbox/Teaching/2016 Spring/GEOG 533/projects/Geog
533_Lecture_ch01"
> A <- matrix(c(1:8),nrow = 4,ncol = 2)
> A
      [,1] [,2]
[1,]    1    5
[2,]    2    6
[3,]    3    7
[4,]    4    8
> B <- matrix(c(1:8),nrow = 4, ncol = 2, byrow = TRUE)
> B
      [,1] [,2]
[1,]    1    2
[2,]    3    4
[3,]    5    6
[4,]    7    8
> view(A)
> view(B)
> view(A)
> |
```

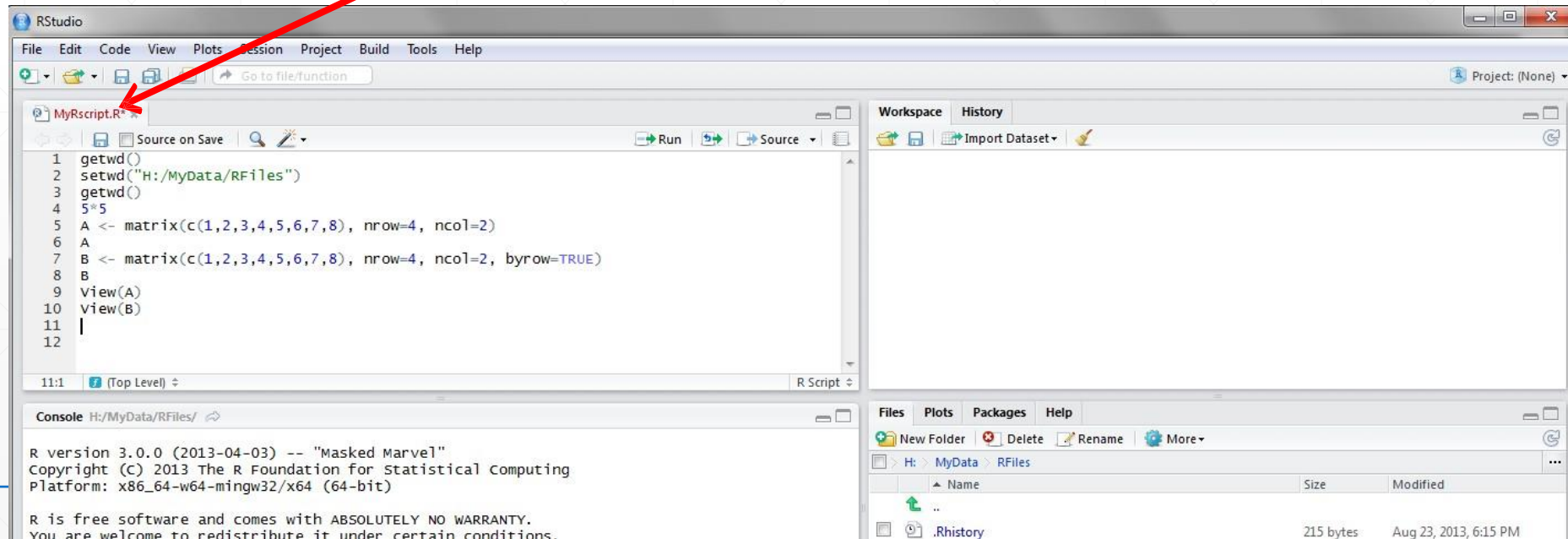
Name	Size	Modified
..		
Geog533_Lecture_Ch01.Rproj	218 B	Jan 26, 2016, 10:13 AM
main.R	142 B	Jan 26, 2016, 10:54 AM

R script (1)

The usual RStudio screen has four windows:

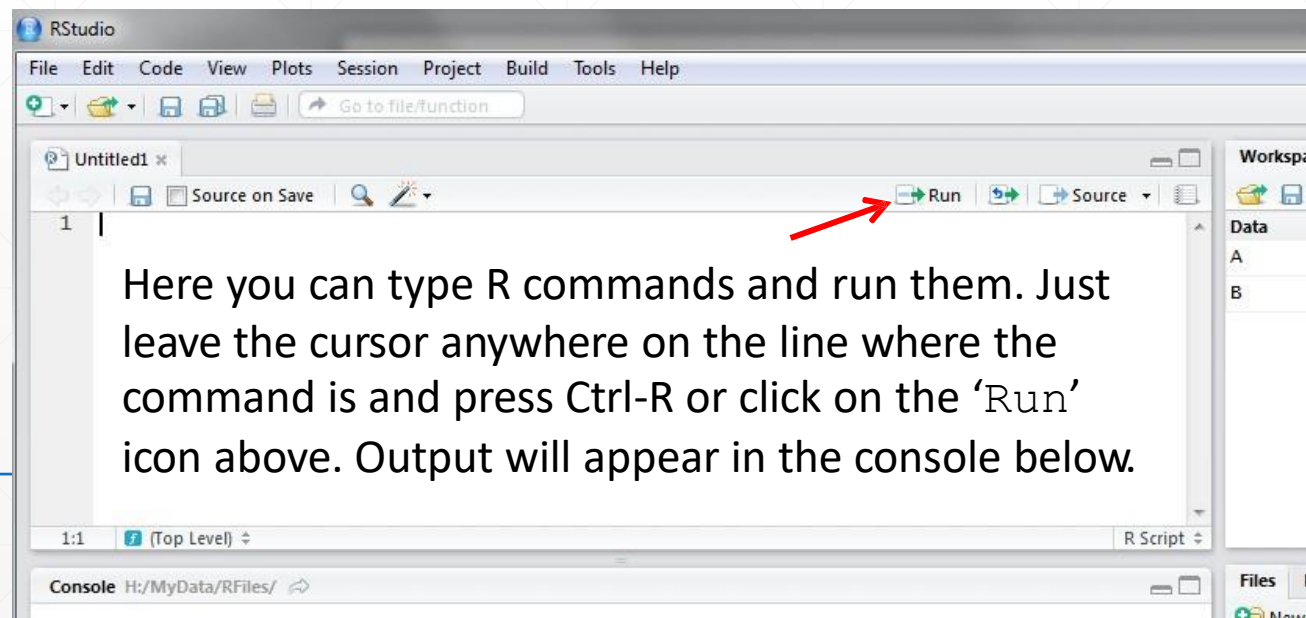
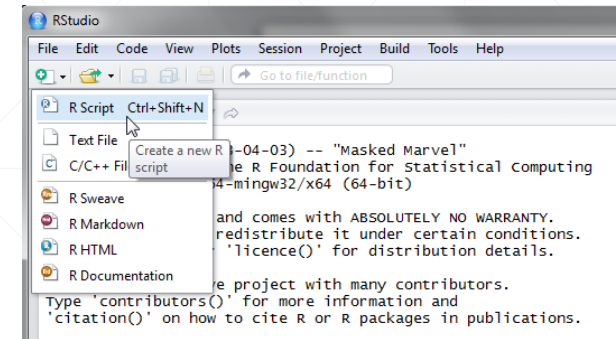
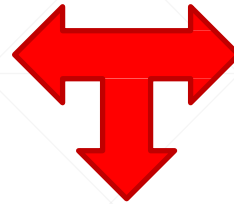
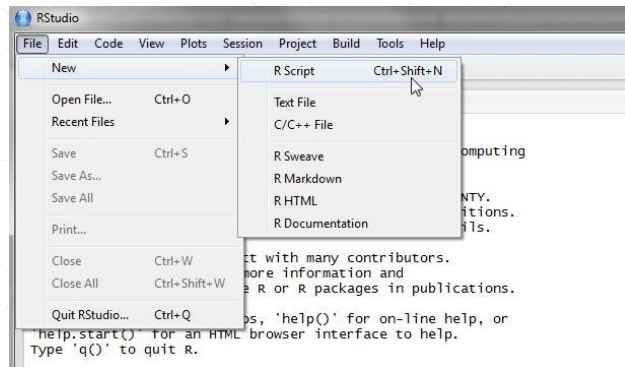
1. Console.
2. Environment and history.
3. Files, plots, packages and help.
4. The R script(s) and data view.

The R script is where you keep a record of your work.



R script (2)

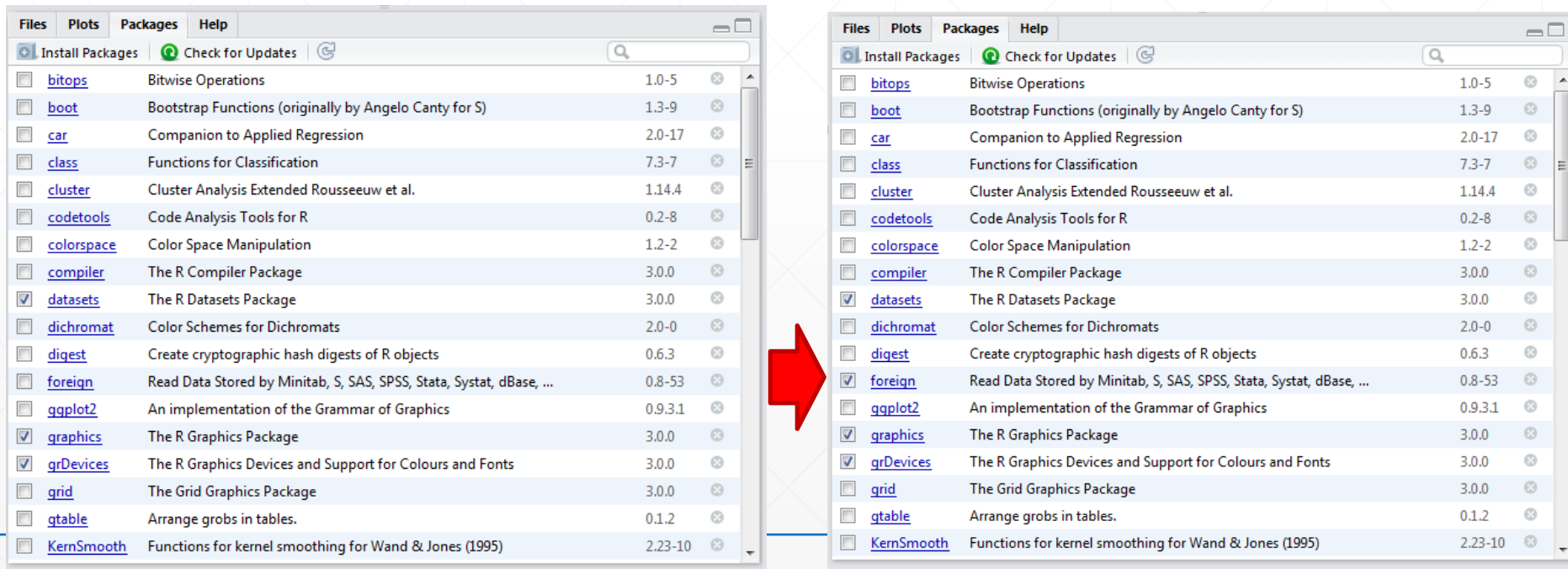
To create a new R script you can either go to `File -> New -> R Script`, or click on the icon with the “+” sign and select “R Script”, or simply press `Ctrl+Shift+N`. Make sure to save the script.



Here you can type R commands and run them. Just leave the cursor anywhere on the line where the command is and press `Ctrl-R` or click on the ‘Run’ icon above. Output will appear in the console below.

Packages tab

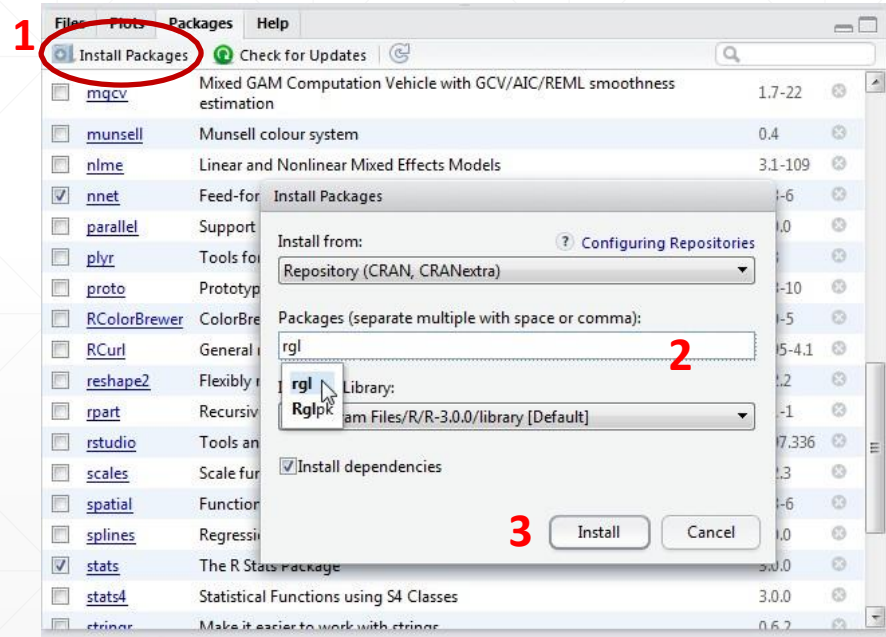
The package tab shows the list of add-ons included in the installation of RStudio. If checked, the package is loaded into R, if not, any command related to that package won't work, you will need select it. You can also install other add-ons by clicking on the 'Install Packages' icon. Another way to activate a package is by typing, for example, `library(foreign)`. This will automatically check the `--foreign` package (it helps bring data from proprietary formats like Stata, SAS or SPSS).



Installing a package

<input type="checkbox"/>	RCurl	General network (HTTP/FTP/...) client interface for R	1.95-4.1	×
<input type="checkbox"/>	reshape2	Flexibly reshape data: a reboot of the reshape package.	1.2.2	×
<input type="checkbox"/>	rpart	Recursive Partitioning	4.1-1	×

Before



We are going to install the package – `rgl` (useful to plot 3D images). It does not come with the original R install.


Click on “Install Packages”, write the name in the pop-up window and click on “Install”.

After

<input type="checkbox"/>	RCurl	General network (HTTP/FTP/...) client interface for R	1.95-4.1	×
<input type="checkbox"/>	reshape2	Flexibly reshape data: a reboot of the reshape package.	1.2.2	×
<input type="checkbox"/>	rgl	3D visualization device system (OpenGL)	0.93.952	×
<input type="checkbox"/>	rpart	Recursive Partitioning	4.1-1	×

Plots tab (1)

The **plots** tab will display the graphs. The one shown here is created by the command on line 7 in the script above. See next slide to see what happens when you have more than one graph



RStudio interface showing the **Plots** tab. The script in the editor includes the following code:

```
1 library(car) # By John Fox and Sanford Weisberg
2 library(rgl) # By Daniel Adler and Duncan Murdoch
3
4 # Scatterplot per group
5
6 scatterplot(prestige ~ income|type, boxplots=FALSE, span=0.75, data=Prestige)
7
8 # Scatterplots in matrix form
9
10 scatterplotMatrix(~ prestige + income + education, span=0.7, data=Prestige)
11
12 # 3D graph, scatter3d is from the --car package. It will open in a separate window.
13
14 scatter3d(prestige ~ income + education, id.n=3, data=Duncan)
15
```

The console shows the execution of the command on line 7:

```
> scatterplot(prestige~income|type, boxplots=FALSE, span=0.75, data=Prestige)
>
```

The **Plots** tab displays a scatterplot of prestige (y-axis) versus income (x-axis), faceted by type (bc, prof, wc). The plot shows three distinct groups of data points, each with a fitted smoothing line. The legend indicates:

- bc (black circles)
- prof (red triangles)
- wc (green plus signs)

The plot shows that prestige increases with income for all three groups, with the 'prof' group generally having the highest prestige for a given income level.

Plots tab (2)

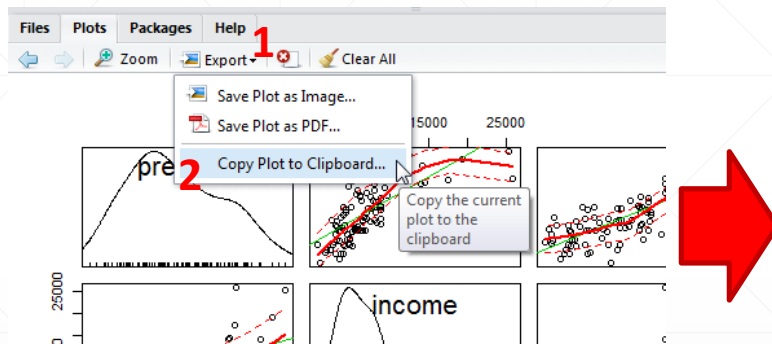
The screenshot shows the RStudio interface with the following components:

- Source Editor:** Contains R code for loading libraries, creating scatterplots, and a 3D scatterplot.
- Console:** Shows the execution of the scatterplot and scatterplotMatrix functions.
- Workspace:** Lists data objects: A (4x2 double matrix), B (4x2 double matrix), and house.pets (3 obs. of 4 variables). It also lists values for feed, pets, run, and weight.
- Plots Pane:** Displays a 3x3 grid of diagnostic plots for the variables prestige, income, and education. The plots include histograms, density plots, and scatterplots with regression lines. A red arrow points to the left-arrow icon in the toolbar, which is used to navigate between plots.

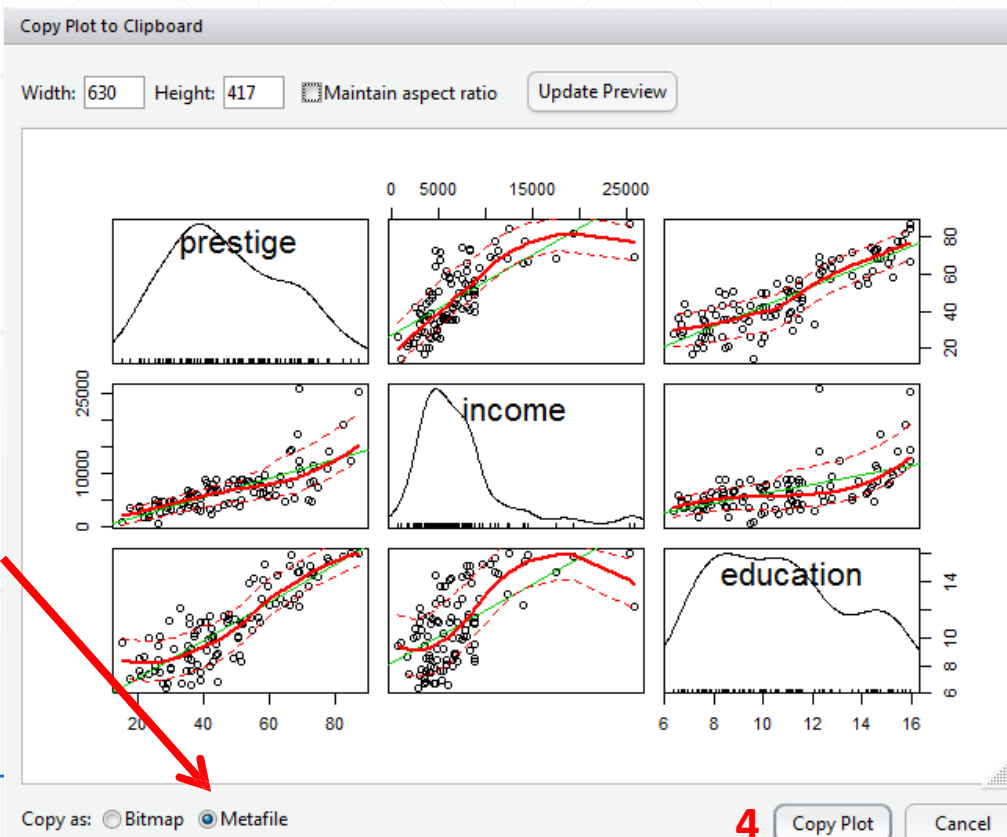
Here there is a second graph (see line 11 above). If you want to see the first one, click on the left-arrow icon.

Plots tab (3) – Graphs export

To extract the graph, click on “Export” where you can save the file as an image (PNG, JPG, etc.) or as PDF, these options are useful when you only want to share the graph or use it in a LaTeX document. Probably, the easiest way to export a graph is by copying it to the clipboard and then paste it directly into your Word document.



3 Make sure to select 'Metafile'



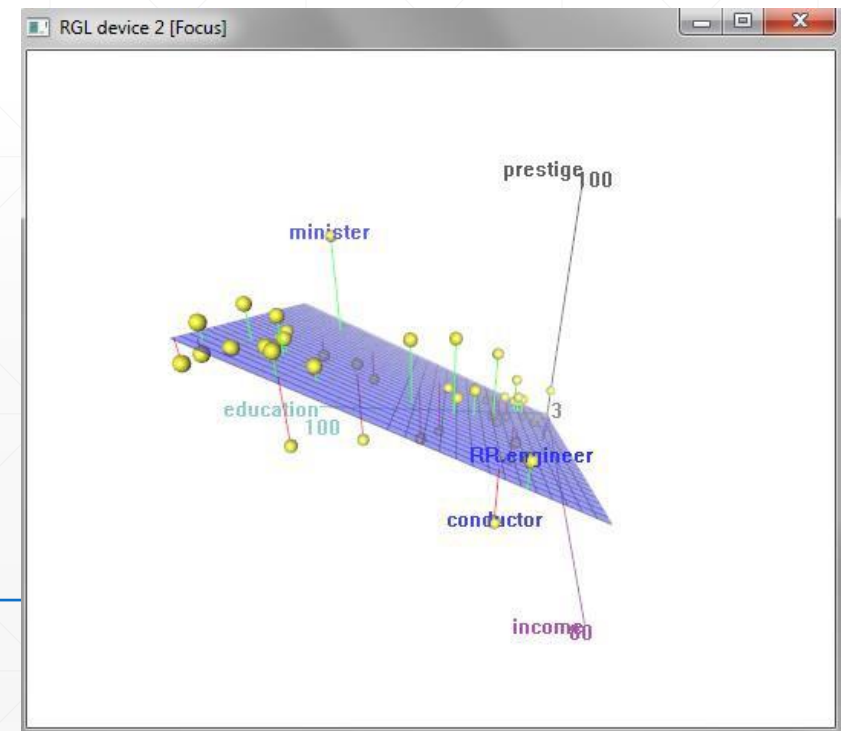
5 Paste it into your Word document

3D graphs

```
RStudio
File Edit Code View Plots Session Project Build Tools Help
Go to file/function
HousePets.R x MyRscript.R x house.pets x A x B x Graphs.R x
Source on Save Run Source
1
2 library(car) # By John Fox and Sanford Weisberg
3 library(rgl) # By Daniel Adler and Duncan Murdoch
4
5 # scatterplot per group
6
7 scatterplot(prestige ~ income|type, boxplots=FALSE, span=0.75, data=Prestige)
8
9 # Scatterplots in matrix form
10
11 scatterplotMatrix(~ prestige + income + education, span=0.7, data=Prestige)
12
13 # 3D graph, scatter3d is from the --car package. It will open in a separate window.
14
15 scatter3d(prestige ~ income + education, id.n=3, data=Duncan)
```

```
Console H:/MyData/RFiles/
> scatterplot(prestige~income|type, boxplots=FALSE, span=0.75, data=Prestige)
> scatterplotMatrix(~ prestige + income + education, span=0.7, data=Prestige)
> scatter3d(prestige ~ income + education, id.n=3, data=Duncan)
>
```

3D graphs will display on a separate screen (see line 15 above). You won't be able to save it, but after moving it around, once you find the angle you want, you can screenshot it and paste it to you Word document.



Useful Resources

➤ RStudio Cheat Sheets

- <https://www.rstudio.com/resources/cheatsheets/>

➤ RStudio Webinars and Videos

- <https://www.rstudio.com/resources/webinars/>

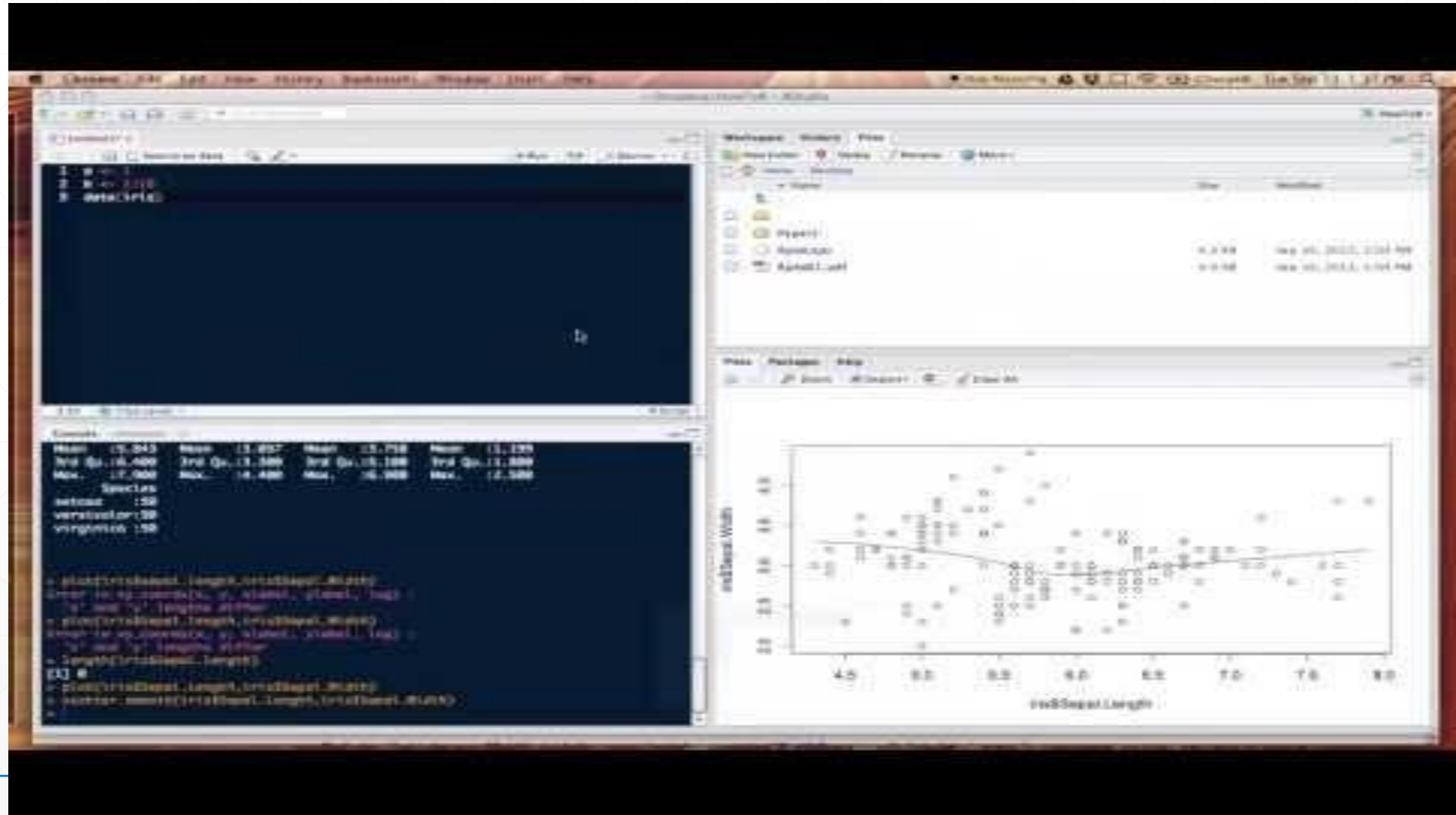
➤ RStudio webinar materials on GitHub

- <https://github.com/rstudio/webinars>

➤ RStudio Documentation

- <https://support.rstudio.com/hc/en-us/sections/200107586-Using-RStudio>
-

Getting started with R and RStudio



R Programming Tutorials

