

Foundation of Machine Learning

CSE4032

Lecture 00: Installation guide for R and RStudio

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Outline

- 1 Introduction
- 2 Setup independent environment
- 3 Setup Anaconda environment
- 4 Start with RStudio
- 5 References

Introduction to R

- R is a free software environment for **statistical computing and graphics**.
- R is the **most popular language** in the world of Data Science.
- It is **heavily used in analyzing data** that is both structured and unstructured.
- This has made R, the **standard language** for performing **statistical operations**.
- R allows various features that set it apart from other Data Science languages.



Why learn R?

- Free and open-source tool
- Large community of users
- Latest cutting edge technology
- Independent platform
- Gateway to lucrative career
- Robust visualization library
- Go to language for Statistics and Data Science
- Used in almost every industry

Setup R environment

- It compiles and runs on a wide variety of UNIX platforms, Windows, and MacOS.
- Download the R installer from <https://cran.r-project.org/>
- Run the installer and keep default settings.
- Must insure that you have **admin rights**. Without this, you will not be able to install additional packages later.
- Usually, I prefer two approaches to setup R environment.
 - Independent environment
 - Anaconda environment

From where to download R

- Download the R installer from <https://cran.r-project.org/>



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[The R Journal](#)

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[R Sources](#)

[R Binaries](#)

[Packages](#)

[Other](#)

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[Manuals](#)

[FAQs](#)

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The Comprehensive R Archive Network

Download and Install R

Precompiled binary distributions of the base system and contributed packages, **Windows and Mac** users most likely want one of these versions of R:

- [Download R for Linux](#)
- [Download R for \(Mac\) OS X](#)
- [Download R for Windows](#)

R is part of many Linux distributions, you should check with your Linux package management system in addition to the link above.

Source Code for all Platforms

Windows and Mac users most likely want to download the precompiled binaries listed in the upper box, not the source code. The sources have to be compiled before you can use them. If you do not know what this means, you probably do not want to do it!

- The latest release (2021-02-15, Lost Library Book) [R-4.0.4.tar.gz](#), read [what's new](#) in the latest version.
- Sources of [R alpha and beta releases](#) (daily snapshots, created only in time periods before a planned release).
- Daily snapshots of current patched and development versions are [available here](#). Please read about [new features and bug fixes](#) before filing corresponding feature requests or bug reports.
- Source code of older versions of R is [available here](#).

From where to download R

- Download the R installer from <https://cran.r-project.org/>



CRAN
[Mirrors](#)
[What's new?](#)
[Task Views](#)
[Search](#)

About R
[R Homepage](#)
[The R Journal](#)

Software
[R Sources](#)
[R Binaries](#)
[Packages](#)
[Other](#)

Documentation
[Manuals](#)

7/58

R for Windows

Subdirectories:

[base](#) Binaries for base distribution. This is what you want to **install R for the first time**.

[contrib](#) Binaries of contributed CRAN packages (for R \geq 2.13.x; managed by Uwe Ligges). There is also information on [third party software](#) available for CRAN Windows services and corresponding environment and make variables.

[old contrib](#) Binaries of contributed CRAN packages for outdated versions of R (for R $<$ 2.13.x; managed by Uwe Ligges).

[Rtools](#) Tools to build R and R packages. This is what you want to build your own packages on Windows, or to build R itself.

Please do not submit binaries to CRAN. Package developers might want to contact Uwe Ligges directly in case of questions / suggestions related to Windows binaries.

You may also want to read the [R FAQ](#) and [R for Windows FAQ](#).

Note: CRAN does some checks on these binaries for viruses, but cannot give guarantees. Use the normal precautions with downloaded executables.

From where to download R

- Download the R installer from <https://cran.r-project.org/>



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[Mirrors](#)
[What's new?](#)
[Task Views](#)
[Search](#)

About R

[R Homepage](#)
[The R Journal](#)

Software

[R Sources](#)
[R Binaries](#)
[Packages](#)
[Other](#)

Documentation

[Manuals](#)
[FAQs](#)
[Contributed](#)

R-4.0.4 for Windows (32/64 bit)

[Download R 4.0.4 for Windows](#) (85 megabytes, 32/64 bit)

[Installation and other instructions](#)
[New features in this version](#)

If you want to double-check that the package you have downloaded matches the package distributed by CRAN, you can compare the [md5sum](#) of the .exe to the [fingerprint](#) on the master server. You will need a version of md5sum for windows: both [graphical](#) and [command line versions](#) are available.

Frequently asked questions

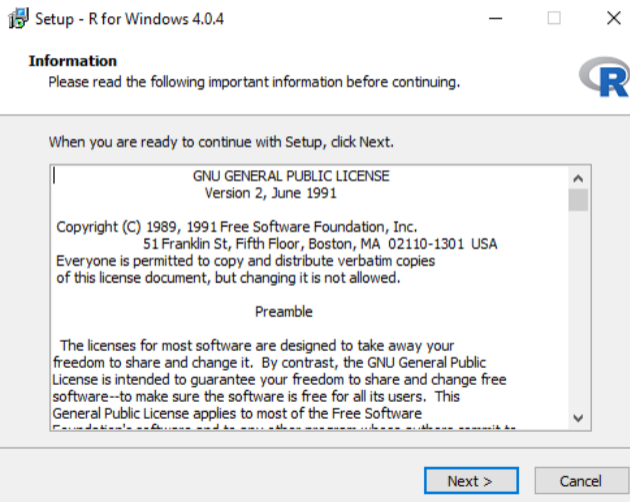
- [Does R run under my version of Windows?](#)
- [How do I update packages in my previous version of R?](#)
- [Should I run 32-bit or 64-bit R?](#)

Please see the [R FAQ](#) for general information about R and the [R Windows FAQ](#) for Windows-specific information.

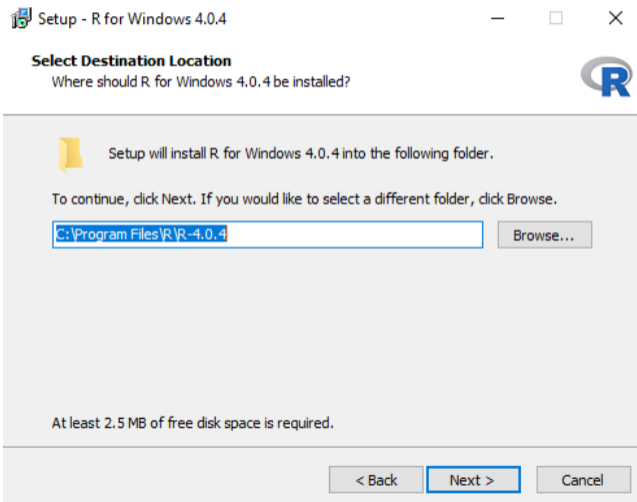
Other builds

- Patches to this release are incorporated in the [r-patched snapshot build](#).
- A build of the development version (which will eventually become the next major release of R) is available in the [r-devel snapshot build](#).
- [Previous releases](#)

R installation guide




R installation guide



R installation guide

Setup - R for Windows 4.0.4

Select Components
Which components should be installed?



Select the components you want to install; clear the components you do not want to install. Click Next when you are ready to continue.

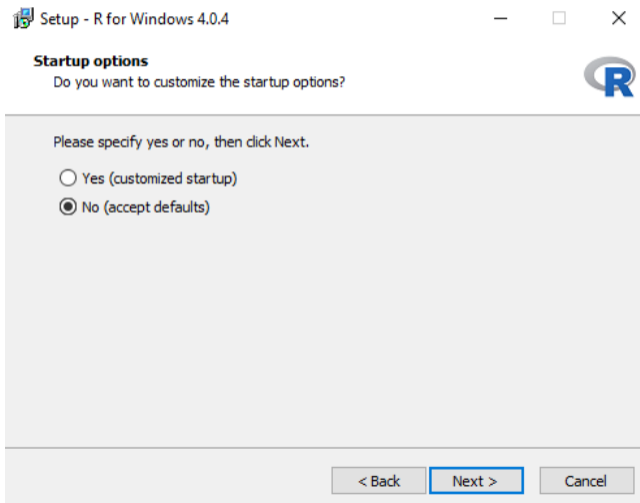
User installation ▾

<input checked="" type="checkbox"/>	Core Files	88.2 MB
<input checked="" type="checkbox"/>	32-bit Files	50.8 MB
<input checked="" type="checkbox"/>	64-bit Files	57.6 MB
<input checked="" type="checkbox"/>	Message translations	7.3 MB

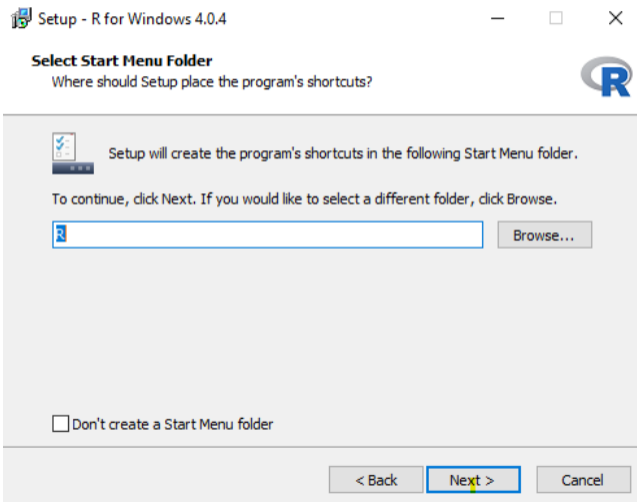
Current selection requires at least 206.1 MB of disk space.

< Back Next > Cancel

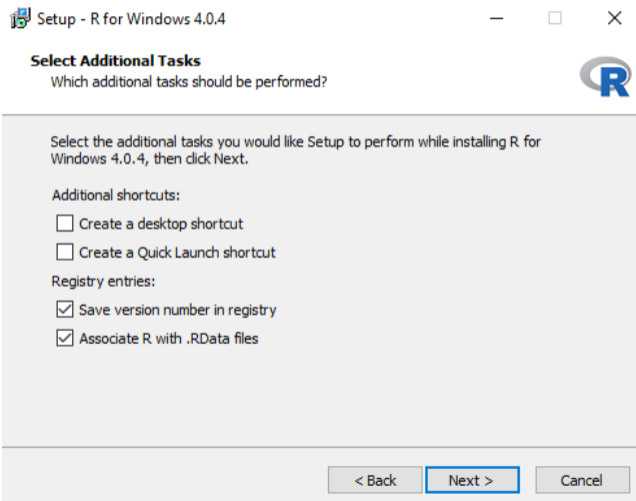
R installation guide



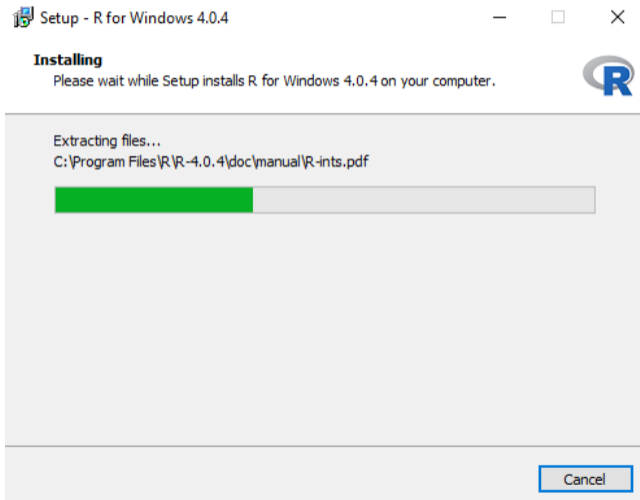
R installation guide



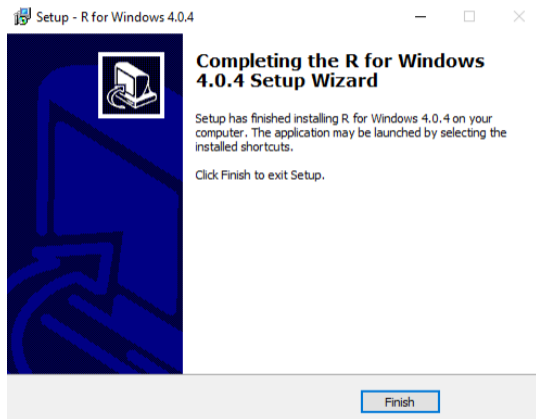
R installation guide



R installation guide



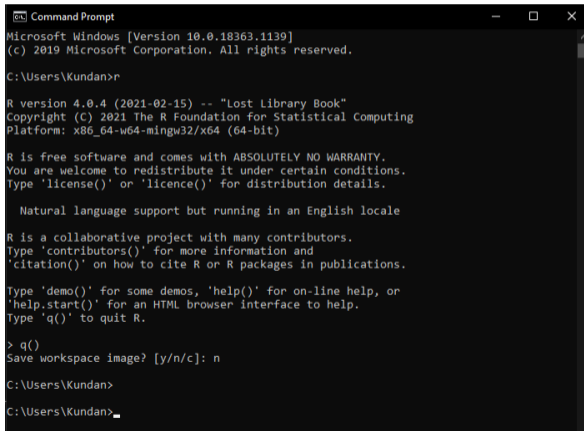
R installation guide



- Don't forget to set the path to use R from command prompt / terminal.

Check R installation

- Type 'r' in Command Prompt to ensure that R is the path.



```
Command Prompt
Microsoft Windows [Version 10.0.18363.1139]
(c) 2019 Microsoft Corporation. All rights reserved.

C:\Users\Kundan>r

R version 4.0.4 (2021-02-15) -- "Lost Library Book"
Copyright (C) 2021 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

Natural language support but running in an English locale

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> q()
Save workspace image? [y/n/c]: n

C:\Users\Kundan>
C:\Users\Kundan>_
```

Use R as a calculator

```

kundan — bash — 80x26

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or R packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

Error: bad restore file magic number (file may be corrupted) -- no data loaded
In addition: Warning message:
file '.RData' has magic number 'RDX3'
Use of save versions prior to 2 is deprecated
During startup - Warning message:
unable to restore saved data in .RData
> 2+2
[1] 4
> sin(90)
[1] 0.8939967
> 2^3
[1] 8
> 2*8
[1] 16
> quit()
Save workspace image? [y/n/c]: n
(base) Kundans-MacBook-Air:~ kundan$
```

From where to download RStudio

- Download the RStudio installer from <https://rstudio.com/products/rstudio/download/#download>

RStudio Desktop 1.4.1106 - Release Notes

1. Install R. RStudio requires R 3.0.1+.
2. Download RStudio Desktop. Recommended for your system:

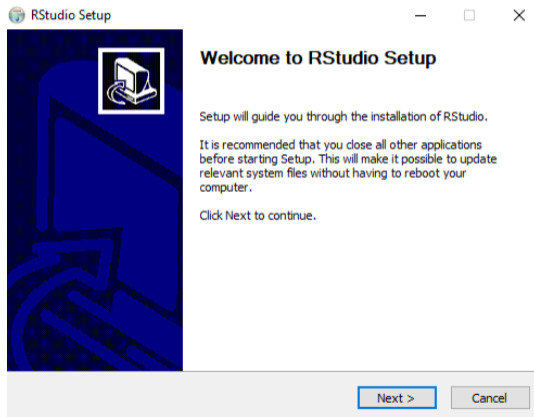


Requires Windows 10/8 (64-bit)

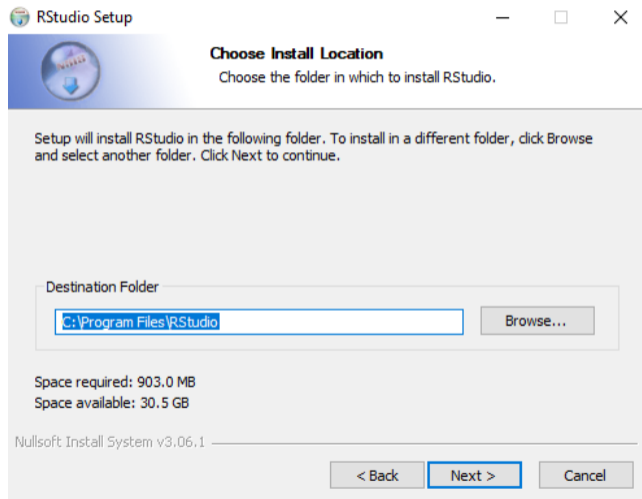


RStudio Installation guide

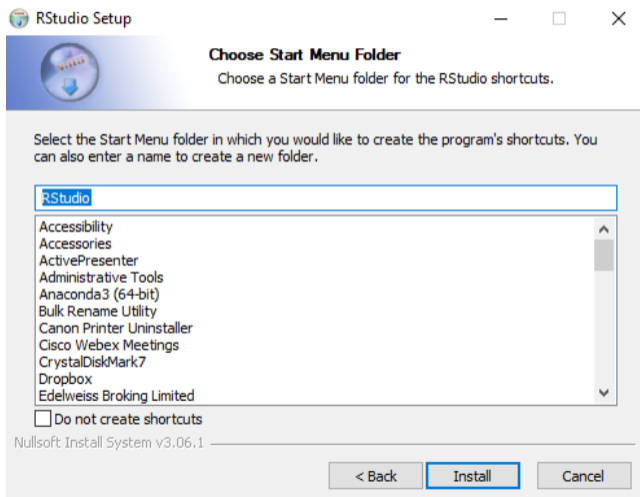
- Run RStudio-1.4.1106.exe as administrator.



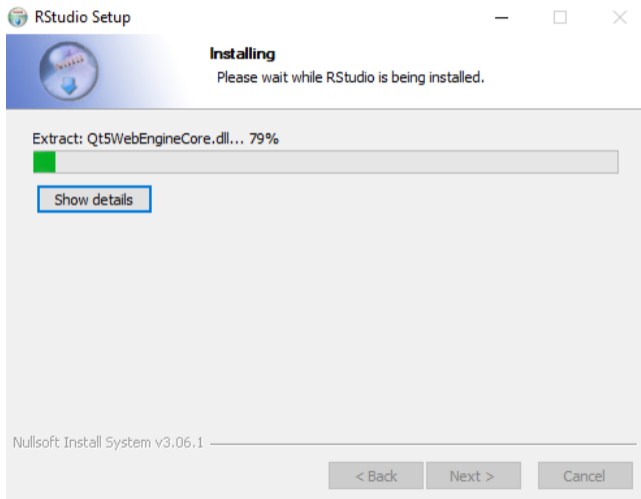
RStudio Installation guide



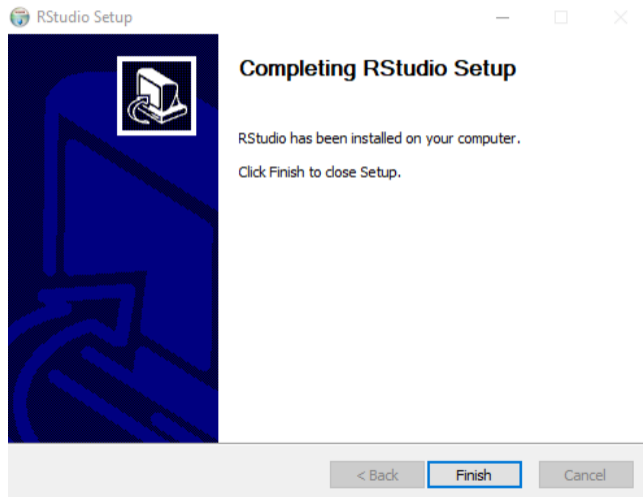
RStudio Installation guide



RStudio Installation guide



RStudio Installation guide



Introduction

- Anaconda is an open-source distribution for **python** and **R**.



- It is used for
 - data science, data analytic,
 - machine learning,
 - deep learning, etc.
- More than 300 libraries are available for data science.
- Simplified package management and deployment.
- An **easily manageable environment setup** which can deploy any project with the click of a single button.

Where to find Anaconda?

1. Go to website: <https://www.anaconda.org>
2. Click on download on top-right corner and scroll down.

①

The screenshot shows the Anaconda.org website. At the top, there is a navigation menu with links for "Gallery", "About", "Anaconda", "Help", "Download Anaconda" (highlighted with a red box), and "Sign In". Below the navigation menu, the main content area is divided into two sections. On the left, there is a search bar labeled "SEARCH PACKAGES" with the text "Search Anaconda.org" inside. On the right, there is a "Join Today" section with "Sign Up" and "Sign In" buttons, and four input fields for "Username", "Email Address", "Enter Password", and "Re-enter Password".

Where to find Anaconda?

3. Scroll down and choose your operating system.
4. Download 64-Bit or 32-Bit Graphical Installer (Python 3.8 version).

The screenshot shows the 'Anaconda Installers' page. It is divided into three columns for Windows, MacOS, and Linux. Under the Windows column, the '64-Bit Graphical Installer (457 MB)' is highlighted with a red box and a circled '4'. Above the Windows column, a circled '3' is placed over the 'Windows' header. Below the main installer list, there is a section titled 'ADDITIONAL INSTALLERS' with a link to older versions and the Miniconda installer homepage.

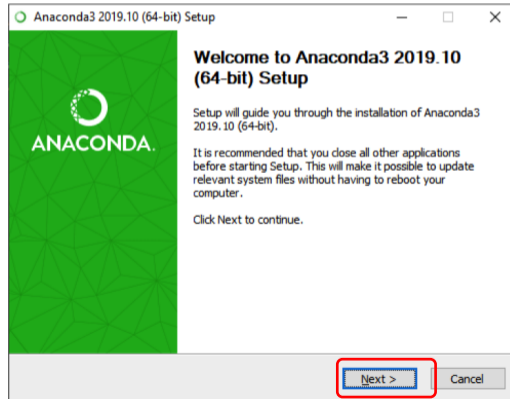
Operating System	Python Version	Installer Type	Size
Windows	Python 3.8	64-Bit Graphical Installer	457 MB
		32-Bit Graphical Installer	403 MB
MacOS	Python 3.8	64-Bit Graphical Installer	435 MB
		64-Bit Command Line Installer	428 MB
Linux	Python 3.8	64-Bit (x86) Installer	529 MB
		64-Bit (Power8 and Power9) Installer	279 MB

ADDITIONAL INSTALLERS

The [archive](#) has older versions of Anaconda Individual Edition installers. The Miniconda installer homepage can be found [here](#).

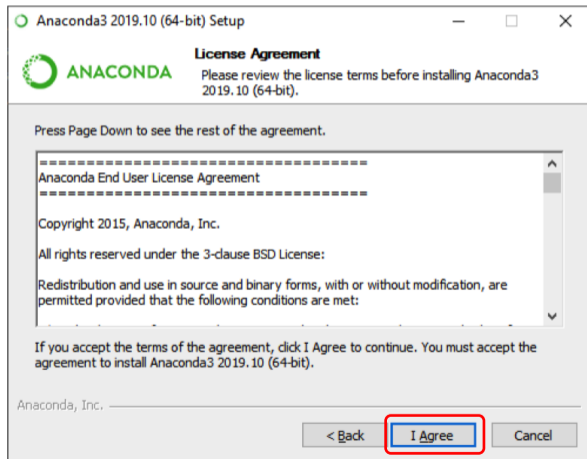
How to install Anaconda?

- In windows, double click the installer to run (you may choose run as Administrator for safe side).
- Click on **Next**.



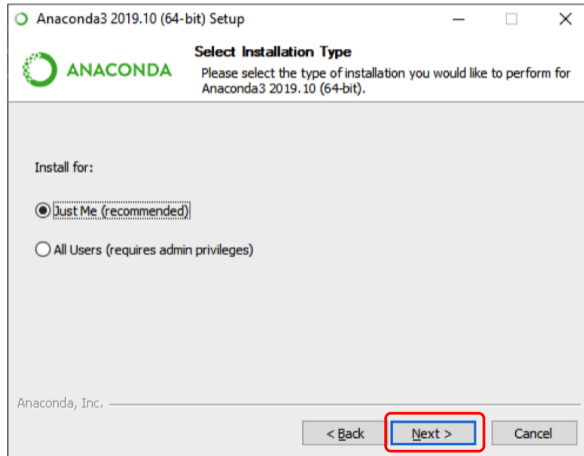
How to install Anaconda?

- Click on **I Agree**.



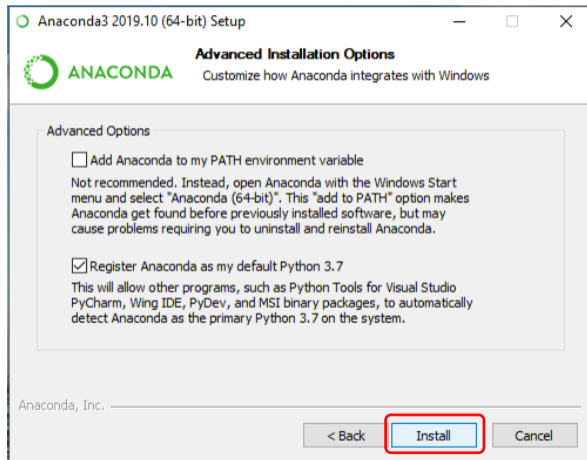
How to install Anaconda?

- Click on **Next**.



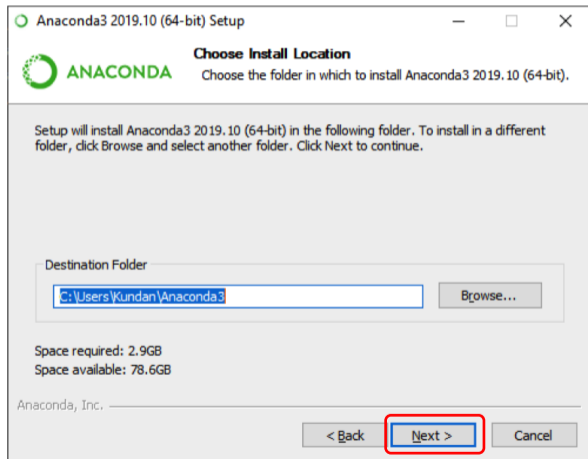
How to install Anaconda?

- Click on **Install**.



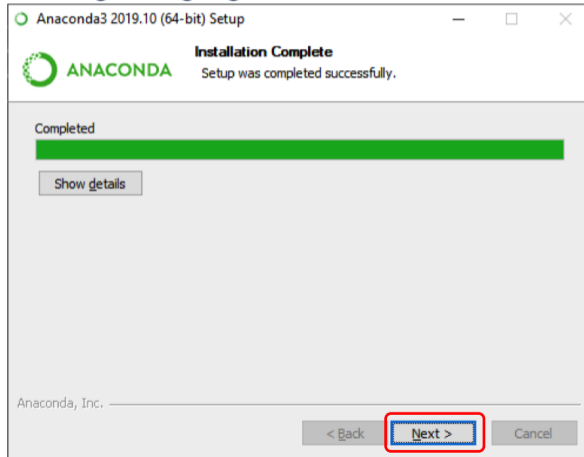
How to install Anaconda?

- Click on **Next**.



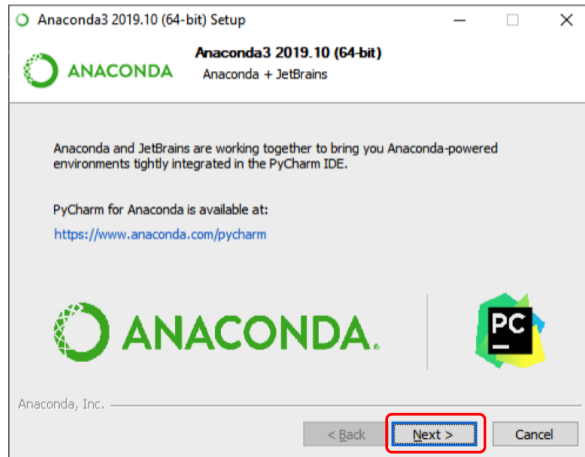
How to install Anaconda?

- Click on **Next**, when it gets highlighted.



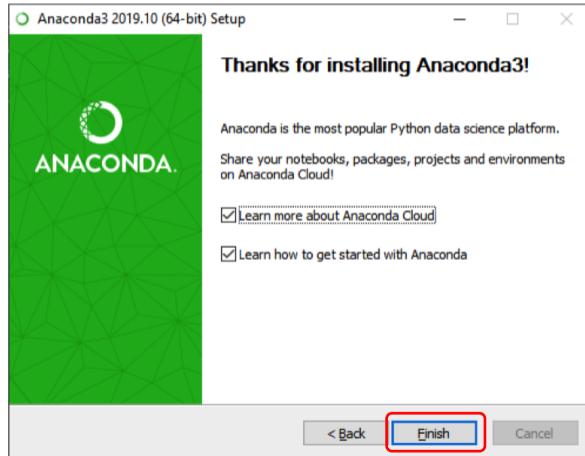
How to install Anaconda?

- Click on **Next**.



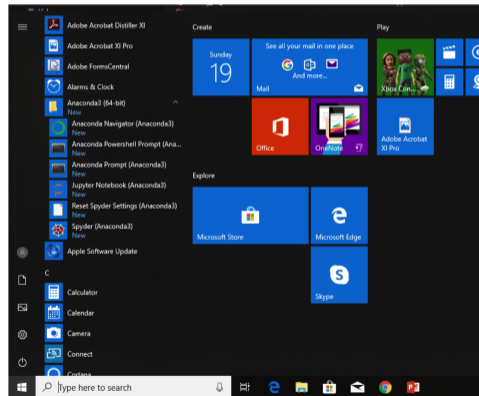
How to install Anaconda?

- Click on **Finish**.



Open Anaconda Powershell Prompt

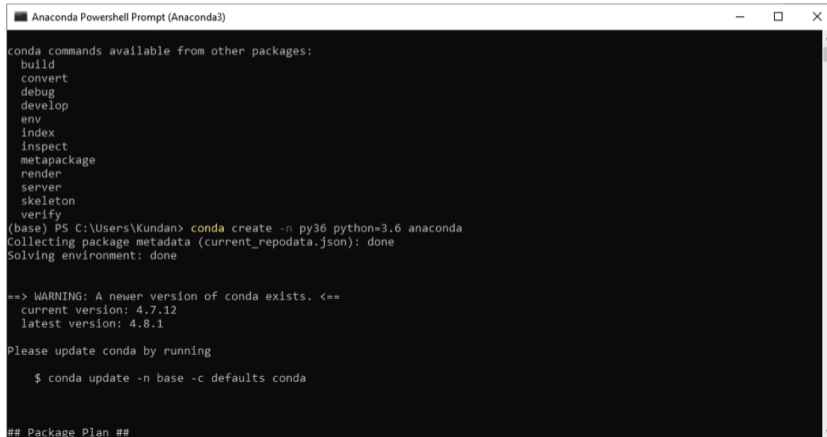
- Go to start (bottom-left corner) and scroll down to find **Anaconda3 (64 bit)**.
- Click on **Anaconda Powershell Prompt** to open it.



Check, is anaconda in path?

- In the powershell prompt run “conda” to ensure that anaconda is in path.

\$ conda



```
Anaconda Powershell Prompt (Anaconda3)
conda commands available from other packages:
  build
  convert
  debug
  develop
  env
  index
  inspect
  metapackage
  render
  server
  skeleton
  verify
(base) PS C:\Users\Kundan> conda create -n py36 python=3.6 anaconda
Collecting package metadata (current_repodata.json): done
Solving environment: done

==> WARNING: A newer version of conda exists. <==
  current version: 4.7.12
  latest version: 4.8.1

Please update conda by running

  $ conda update -n base -c defaults conda

## Package Plan ##
```

How to create a virtual environment for R?

- To create a **virtual environment** for R, run
 - \$ `conda create -n R4 r-essentials r-base`
- press **Y** to proceed. Wait for complete the installation.
- After the completion of the installation, activate the virtual environment as

\$ `conda activate R4`

- Ensure that default environment base is changed to R4.
- To deactivate the environment

\$ `conda deactivate`

NOTE: You can use up and down key in the keyboard to see command history executed.

How to create a virtual environment for Python?

- To create a **virtual environment** for python, run
 - \$ `conda create -n py36 python=3.6 anaconda`
- press **Y** to proceed. Wait for complete the installation.
- After the completion of the installation, activate the virtual environment as
 - \$ `conda activate py36`
- Ensure that default environment base is changed to py36.
- To deactivate the environment
 - \$ `conda deactivate`

NOTE: You can use up and down key in the keyboard to see command history executed.

How to install and start RStudio

- Activate the virtual environment as

```
$ conda activate R4
```

- Ensure that default environment base is changed to R4.
- Install RStudio using following command in terminal

```
$ conda install -c r rstudio
```

- Similarly, other library/package/module can be installed.
- You can install packages manually from [RStudio](#).
- You start RStudio from terminal

```
$ rstudio
```

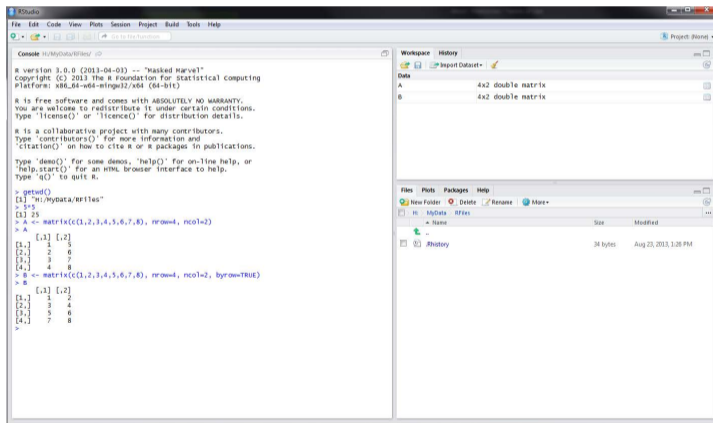
- Alternatively, Jupyter notebook can be used to write your code in R or Python.

How to switch between python and R?

- Deactivate environment if you are already in an environment.
- Then activate environment as per your coding platform.
- Start RStudio or Jupyter Notebook IDE as per you choice.

RStudio screen

- RStudio allows the user to run R in a more user-friendly environment. It is open-source (i.e. free).



The screenshot displays the RStudio environment. The console window on the left shows the R version (3.0.0) and the execution of several R commands. The workspace window on the right shows two data objects, A and B, both of type 4x2 double matrix. The file explorer window at the bottom shows the current project directory, which includes a file named .Rhistory.

```
R version 3.0.0 (2013-04-03) -- "Rasked Marvel"
Copyright (C) 2013 The R Foundation for Statistical Computing
Platform: x86_64-w64-mingw32/x64 (64-bit)

R is free software and comes with ABSOLUTELY NO WARRANTY.
You are welcome to redistribute it under certain conditions.
Type 'license()' or 'licence()' for distribution details.

R is a collaborative project with many contributors.
Type 'contributors()' for more information and
'citation()' on how to cite R or a packages in publications.

Type 'demo()' for some demos, 'help()' for on-line help, or
'help.start()' for an HTML browser interface to help.
Type 'q()' to quit R.

> getwd()
[1] "H:/MyData/rfiles"
> 5*5
[1] 25
> A <- matrix(c(1,2,3,4,5,6,7,8), nrow=4, ncol=2)
> A
      [,1] [,2]
[1,] 1     5
[2,] 2     6
[3,] 3     7
[4,] 4     8
> B <- matrix(c(1,2,3,4,5,6,7,8), nrow=4, ncol=2, byrow=TRUE)
> B
      [,1] [,2]
[1,] 1     2
[2,] 3     4
[3,] 5     6
[4,] 7     8
>
```

Workspace tab

- The workspace 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 in specific window.

```
RStudio
File Edit Code View Plots Session Project Build Tools Help
Go to file/function
HousePets.R x MyRscript.R x house.pets x
Source on Save
1 getwd()
2 setwd("H:/MyData/RFiles")
3 getwd()
4 3*5
5 A <- matrix(c(1,2,3,4,5,6,7,8), nrow=4, ncol=2)
6 A
7 B <- matrix(c(1,2,3,4,5,6,7,8), nrow=4, ncol=2, byrow=TRUE)
8 B
```

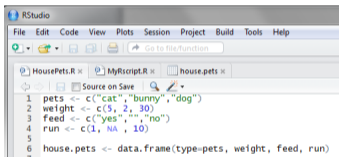
The screenshot shows the RStudio interface with the workspace tab active. The workspace contains three objects: 'A' (a 4x2 double matrix), 'B' (a 4x2 double matrix), and 'house.pets' (3 observations of 4 variables). The 'house.pets' object is expanded to show a table of data. Red arrows point from the text below to the dotted squares next to 'A' and 'B' in the workspace, and from the text below to the 'house.pets' object.

V1	V2
1	2
2	4
3	6
4	8

Showing here matrix B. To see matrix A click on the respective tab.

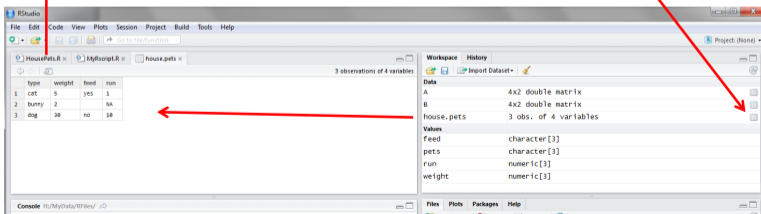
Workspace tab

- Here is another example on how the workspace looks like when more objects are added. Notice that the data frame `house.pets` is formed from different individual values or vectors.



```
1 pets <- c("cat", "bunny", "dog")
2 weight <- c(5, 2, 30)
3 feed <- c("yes", "", "no")
4 run <- c(1, NA, 10)
5
6 house.pets <- data.frame(type=pets, weight, feed, run)
7
```

Click on the dotted square to look at the dataset in a spreadsheet form.



Workspace History

Data	
A	4x2 double matrix
B	4x2 double matrix
house.pets	3 obs. of 4 variables

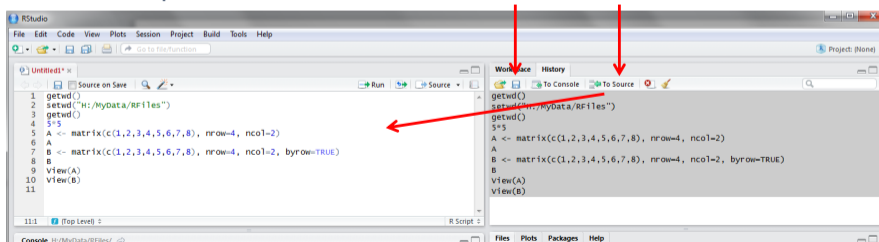
Values

feed	character [3]
pets	character [3]
run	numeric [3]
weight	numeric [3]

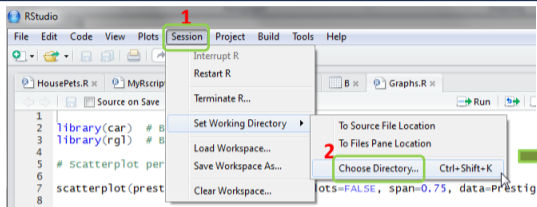
type	weight	feed	run
1 cat	5	yes	1
2 bunny	2	NA	NA
3 dog	30	no	10

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



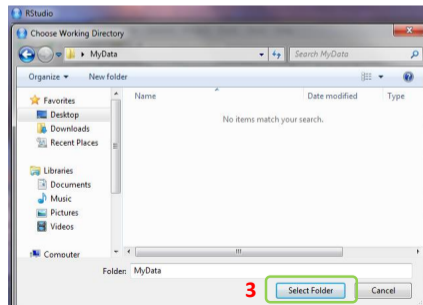
If you have different projects you can change the working directory for that session, see above. Or you can type:

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

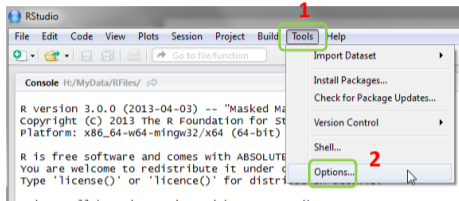
```
getwd()
```

```
# Changes the wd
```

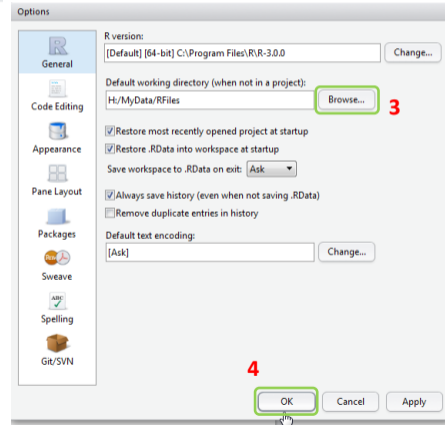
```
setwd("C:/myfolder/data")
```



Setting a default working directory

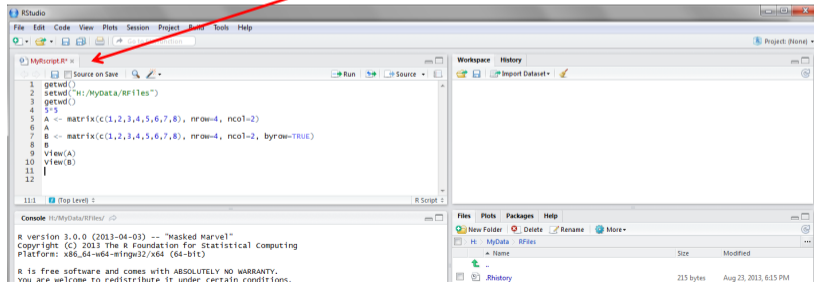


Every time you open RStudio, it goes to a default directory. You can change the default to a folder where you have your datafiles so you do not have to do it every time. In the menu go to Tools->Options



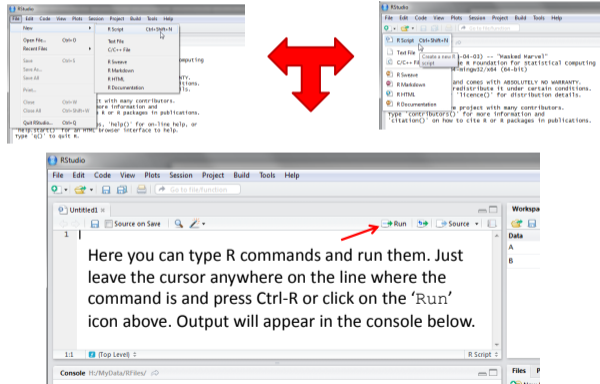
R script

- The usual RStudio screen has four windows:
 1. Console.
 2. Workspace/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

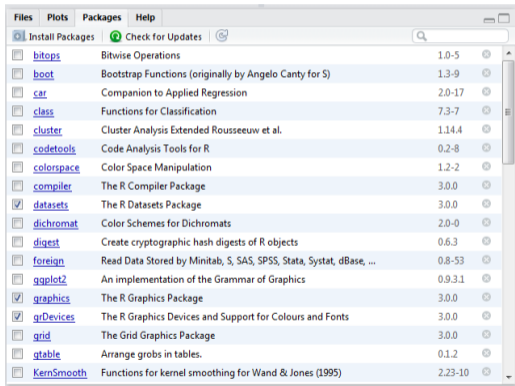
- To create a new R script you can either go to File → New → R Script, or click on the icon with the “+” sign and select “R Script”, or simply press Ctrl+Shift+N. Make sure to save the script.



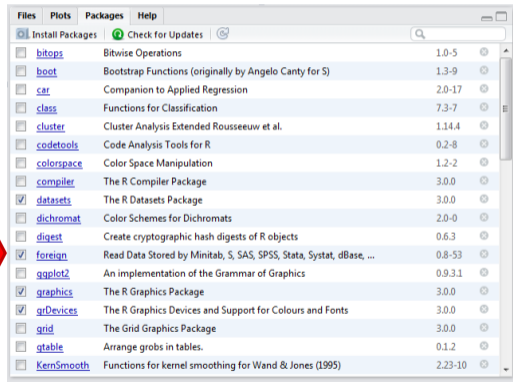
Packages tab

- 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).

Packages tab



Package	Description	Version	Status
<input type="checkbox"/> bitops	Bitwise Operations	1.0-5	✖
<input type="checkbox"/> boot	Bootstrap Functions (originally by Angelo Canty for S)	1.3-9	✖
<input type="checkbox"/> car	Companion to Applied Regression	2.0-17	✖
<input type="checkbox"/> class	Functions for Classification	7.3-7	✖
<input type="checkbox"/> cluster	Cluster Analysis Extended Rousseeuw et al.	1.14.4	✖
<input type="checkbox"/> codetools	Code Analysis Tools for R	0.2-8	✖
<input type="checkbox"/> colorspace	Color Space Manipulation	1.2-2	✖
<input type="checkbox"/> compiler	The R Compiler Package	3.0.0	✖
<input checked="" type="checkbox"/> datasets	The R Datasets Package	3.0.0	✖
<input type="checkbox"/> dichromat	Color Schemes for Dichromats	2.0-0	✖
<input type="checkbox"/> digest	Create cryptographic hash digests of R objects	0.6.3	✖
<input type="checkbox"/> foreign	Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, dBase, ...	0.8-53	✖
<input type="checkbox"/> ggplot2	An implementation of the Grammar of Graphics	0.9.3.1	✖
<input checked="" type="checkbox"/> graphics	The R Graphics Package	3.0.0	✖
<input checked="" type="checkbox"/> grDevices	The R Graphics Devices and Support for Colours and Fonts	3.0.0	✖
<input type="checkbox"/> grid	The Grid Graphics Package	3.0.0	✖
<input type="checkbox"/> gtable	Arrange grobs in tables.	0.1.2	✖
<input type="checkbox"/> KernSmooth	Functions for kernel smoothing for Wand & Jones (1995)	2.23-10	✖

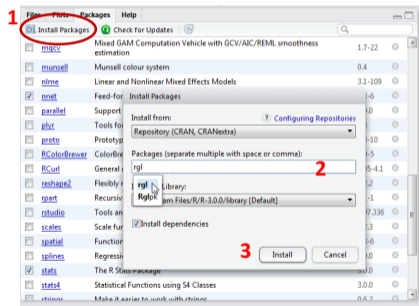


Package	Description	Version	Status
<input type="checkbox"/> bitops	Bitwise Operations	1.0-5	✖
<input type="checkbox"/> boot	Bootstrap Functions (originally by Angelo Canty for S)	1.3-9	✖
<input type="checkbox"/> car	Companion to Applied Regression	2.0-17	✖
<input type="checkbox"/> class	Functions for Classification	7.3-7	✖
<input type="checkbox"/> cluster	Cluster Analysis Extended Rousseeuw et al.	1.14.4	✖
<input type="checkbox"/> codetools	Code Analysis Tools for R	0.2-8	✖
<input type="checkbox"/> colorspace	Color Space Manipulation	1.2-2	✖
<input type="checkbox"/> compiler	The R Compiler Package	3.0.0	✖
<input checked="" type="checkbox"/> datasets	The R Datasets Package	3.0.0	✖
<input type="checkbox"/> dichromat	Color Schemes for Dichromats	2.0-0	✖
<input type="checkbox"/> digest	Create cryptographic hash digests of R objects	0.6.3	✖
<input checked="" type="checkbox"/> foreign	Read Data Stored by Minitab, S, SAS, SPSS, Stata, Systat, dBase, ...	0.8-53	✖
<input type="checkbox"/> ggplot2	An implementation of the Grammar of Graphics	0.9.3.1	✖
<input checked="" type="checkbox"/> graphics	The R Graphics Package	3.0.0	✖
<input checked="" type="checkbox"/> grDevices	The R Graphics Devices and Support for Colours and Fonts	3.0.0	✖
<input type="checkbox"/> grid	The Grid Graphics Package	3.0.0	✖
<input type="checkbox"/> gtable	Arrange grobs in tables.	0.1.2	✖
<input type="checkbox"/> KernSmooth	Functions for kernel smoothing for Wand & Jones (1995)	2.23-10	✖

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



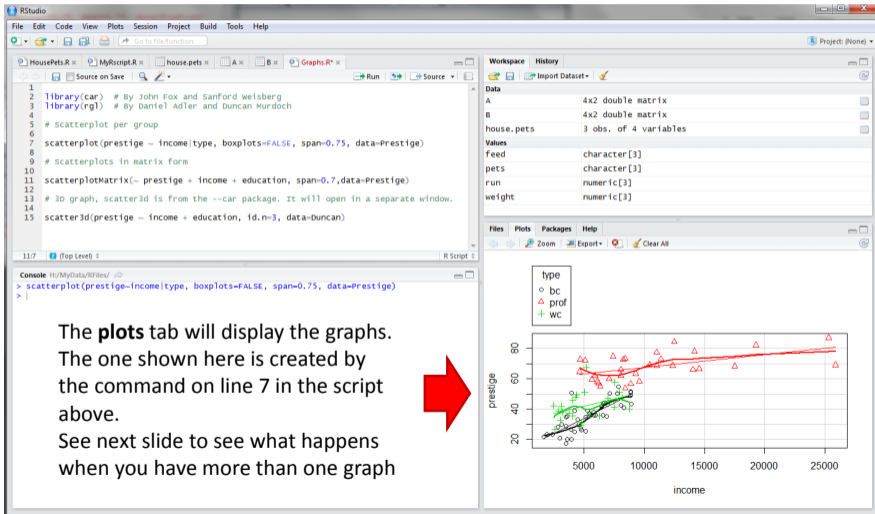
We are going to install the package – `rgl` (useful to plot 3D images). It does not come with the original R install.

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



The screenshot shows the RStudio interface. The top menu bar includes File, Edit, Code, View, Plots, Session, Project, Build, Tools, and Help. The main editor window contains the following R script:

```
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
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)
```

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

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

The Plots tab on the right displays a scatter plot of prestige (y-axis, 20 to 80) versus income (x-axis, 5000 to 25000). The plot is faceted by 'type' (bc, prof, wc) and includes a legend. A red arrow points from the text to the plot.

The workspace on the right shows the following objects:

Object	Type
A	4x2 double matrix
B	4x2 double matrix
house.pets	3 obs. of 4 variables
feed	character[3]
pets	character[3]
run	numeric[3]
weight	numeric[3]

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

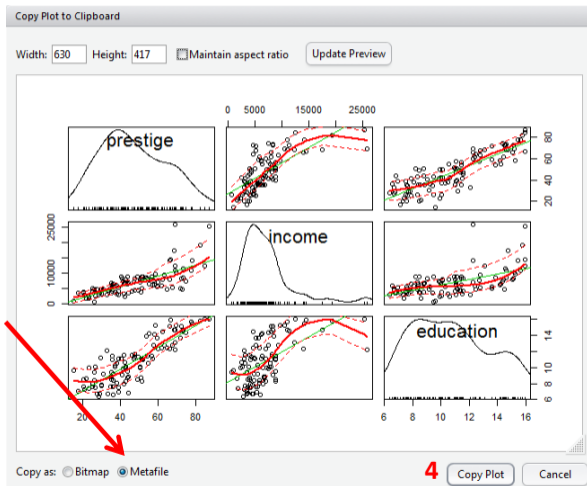
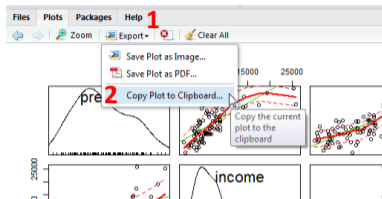
Plots tab

The screenshot shows the RStudio interface with the following components:

- Source Editor:** Contains R code for plotting. Line 11 is highlighted with a red arrow pointing to the console.
- Console:** Shows the execution of the code from line 11, resulting in a second plot.
- Workspace:** Lists objects: A (4x2 double matrix), B (4x2 double matrix), house.pets (3 obs. of 4 variables), Feed (character[3]), pets (character[3]), run (numeric[3]), and weight (numeric[3]).
- Plots Panel:** Displays a 3x3 grid of plots for variables 'prestige', 'income', and 'education'. Each plot includes a histogram on the diagonal and scatter plots with regression lines in the off-diagonal cells.

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 - Graphs export



3 Make sure to select 'Metafile'

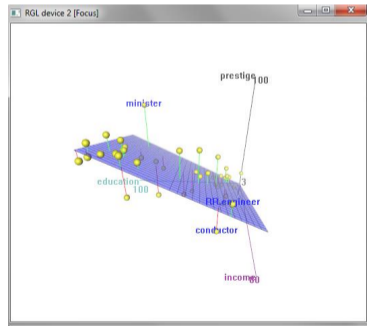
5 Paste it into your Word document

Plots tab - 3D graphs





```
RStudio
File Edit Code View Plots Session Project Build Tools Help
Go to file/function
HousePets.R MyRScript.R house.pets A B Graphs.R
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, ld.n=3, data=Duncan)
```

```
Console: H:/MyData/B/Files/ >
> scatterplot(prestige~income|type, boxplots=FALSE, span=0.75, data=Prestige)
> scatterplotMatrix(~ prestige + income + education, span=0.7, data=Prestige)
> scatter3d(prestige ~ income + education, ld.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.



References

-  Introduction to RStudio, <https://dss.princeton.edu/training/RStudio101.pdf>
-  The Comprehensive R Archive Network, <https://cran.r-project.org/>
-  RStudio Desktop,
<https://www.rstudio.com/products/rstudio/download/#download>
-  Anaconda, Where packages, notebooks, projects and environments are shared,
<https://www.anaconda.com/products/individual>



Thank you!