

# Štatistika v jazyku R

## Základy



Lektor:  
Kontakt:

PhDr. Ing. Mgr. Miroslav Reiter, DiS., DBA, MPA  
[miroslav.reiter@it-academy.sk](mailto:miroslav.reiter@it-academy.sk)

# Ako začneme?

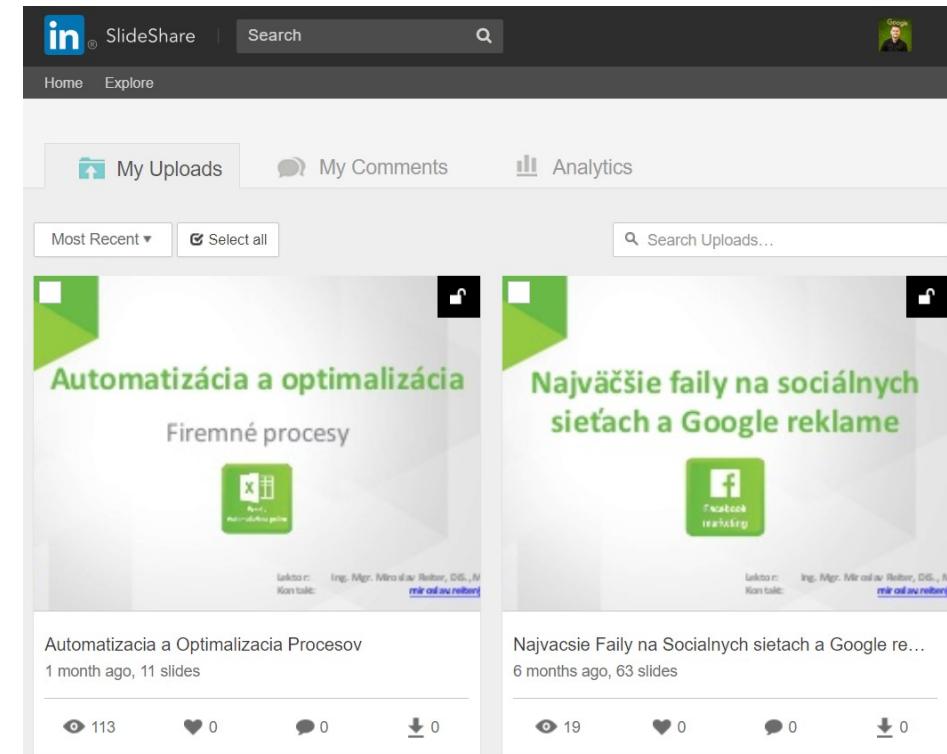
## 1. Stiahni si R a Anaconda Navigator

- <https://cran.r-project.org/bin/windows/base/>
- <https://www.anaconda.com/products/distribution>

## 2. Pridaj si ma na LinkedIn

- <https://www.linkedin.com/in/miroslav-reiter/>

## 3. Prezentácia a materiály po prednáške



# O lektorovi - Miroslav Reiter

10000+  
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500+ firiem

Programátor  
Analytik  
Manažér

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114  
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83 príručiek a  
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12 škôl

52 projektov

 Nástenka Domovská stránka Kalendár Súkromné súbory Moje kurzy ZPP2 SDvP R

## Štatistika v R

Kurz je venovaný základom práce v programovacom jazyku a prostredí R so zameraním na štatistické vyhodnotenie dát.

R je programovací jazyk a softvérové prostredie pre štatistickú analýzu a vizualizáciu.

Na kurz je potrebné poznať aspoň základy programovania, práce s dátami a štatistiky.

## Myšlienkové mapy

Myšlienkové mapy ( *MindMaps* ) slúžia ako univerzálny nástroj na podporu riešenia akýchkoľvek problémov ( nielen softwarových )

## Objektovo-orientované myslenie, analýza, design a UML

- Úvod do objektovo-orientovaného myslenia, analýzy a designu SW.
- Notácia UML2 slúžiaca na dokumentovanie procesu vývoja SW.

## JAVA platforma a programovanie

JAVA ako :

- Univerzálna SW platforma pre rôzne operačné systémy

 ZPP Účastníci Odznaky Kompetencie Známky Všeobecné Základné informácie Premenné a typy dát Operátory Podmienky a cykly Funkcie Práca so súbormi Objekty Nástenka Domovská stránka Kalendár Súkromné súbory Content bank Moje kurzy

# Základy programovacieho jazyku Python

[Zapnúť upravovanie](#) Oznámenia Informácie o kurze Sylabus kurzu Študijné materiály Jupyter

login: student

heslo: Jupyter2021

## Základné informácie

 Prednáška Hello World

## Premenné a typy dát

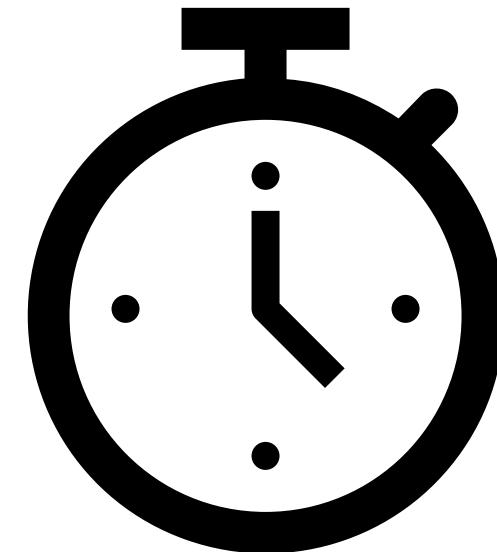
 Premenné a typy dát

## Operátory

 Operátory

# Úvodné informácie

- Časový rozvrh (9:00-13:30)
  - Prestávky
  - Mobilné telefóny a zariadenia
- 
- Priprav si otázky a rovno sa pýtaj
  - Interaktívna forma



# O lektorovi - Miroslav Reiter

10000+  
klientov a  
500+ firiem

Programátor  
Analytik  
Manažér

Google,  
Microsoft  
ISTQB tréner

115  
certifikácií

83 príručiek a  
publikácií

12 škôl

52 projektov

Vlastná firma

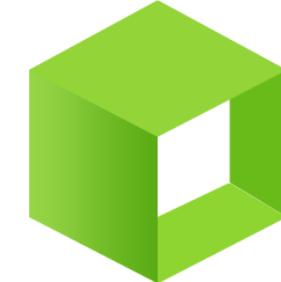


# Miroslav Reiter

1. PhDr. VŠM (Podnikovný manažment)
2. Ing. STU FEI (**Aplikovaná informatika**)
3. Mgr. UK FM (Strategický manažment a marketing)
4. Mgr. VŠM (**Manažérstvo kvality**)
5. Mgr. VŠEMVŠ (Verejná správa)
6. Mgr. DTI (Učiteľstvo ekonomických predmetov)
7. DiS. AMOS (Cestovný ruch)
8. MBA LIGS (Executive management)
9. DBA Humanum (**IT manažment**)
10. MPA IES (Verejná správa a samospráva krajov)
11. MSc. Humanum (**Bezpečnosť informačných systémov**)
12. Ing. Paed. IGIP



DIGITÁLNA  
UNIVERZITA



IT ACADEMY





**FAKULTA MANAGEMENTU**  
Univerzita Komenského  
v Bratislave



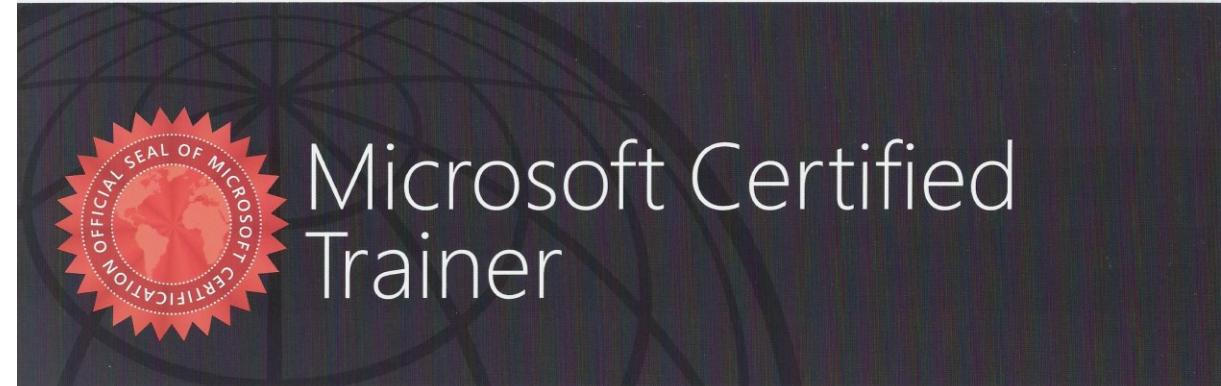
# Kde učím a vzdelávam?

# Miroslav Reiter

získava status  
**Google Certified Trainer**

Automation

Google



MIROSLAV REITER

Has successfully completed the requirements to be recognized as a Microsoft Certified Trainer

N. S. Nadella  
Satya Nadella  
Chief Executive Officer

Microsoft  
CERTIFIED  
Trainer

# Čo robíte?

1. Študent/učiteľ

2. Zamestnanec

3. Podnikateľ

4. Nezamestnaný/materská

5. Dievča pre všetko



National competence centre for high performance computing  
SLOVAKIA



EURO



**EuroHPC**  
Joint Undertaking





### Vzdelávanie

Kurzy:  
[itkurzy.sav.sk](https://itkurzy.sav.sk)



### Propagácia

Prednášky:  
[https://eurocc.nscc.sk  
/news/prednasky/](https://eurocc.nscc.sk/news/prednasky/)



### HPC služby

Prístup k  
výpočtovým  
prostriedkom



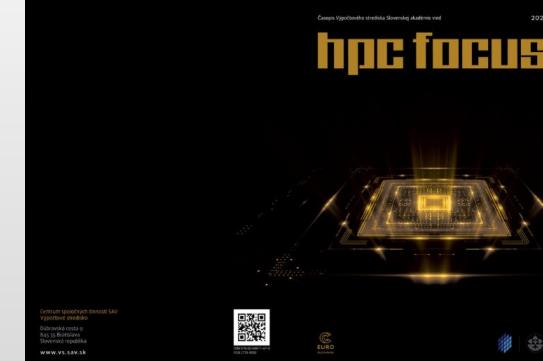
### Mapovanie HPC prostredia

Prieskum:  
[https://eurocc.nscc.sk  
/mapping-survey/](https://eurocc.nscc.sk/mapping-survey/)



### Spolupráca

Pilotné projekty  
Dlhodobá  
spolupráca



**Qubit**  
Conference

robíme it

Slovenská  
obchodná  
a priemyselná  
komora

**S kým spolupracujeme:**

- Akademické inštitúcie, univerzity,  
ústavy SAV,...
- Verejná správa
- Súkromné firmy, tretí sektor

**Naučte sa pracovať v prostredí  
HPC systémov:**

Najbližší kurz:

[HPC infraštruktúra](#) / 18. máj 2022

**Hľadáme nových kolegov do tímu!**

<https://eurocc.nscc.sk/career/>



**Sledujte nás na sociálnych sietiach:**



# Interaktívna prednáška

Aktívne  
používanie a  
zapájanie sa

Participants (20)

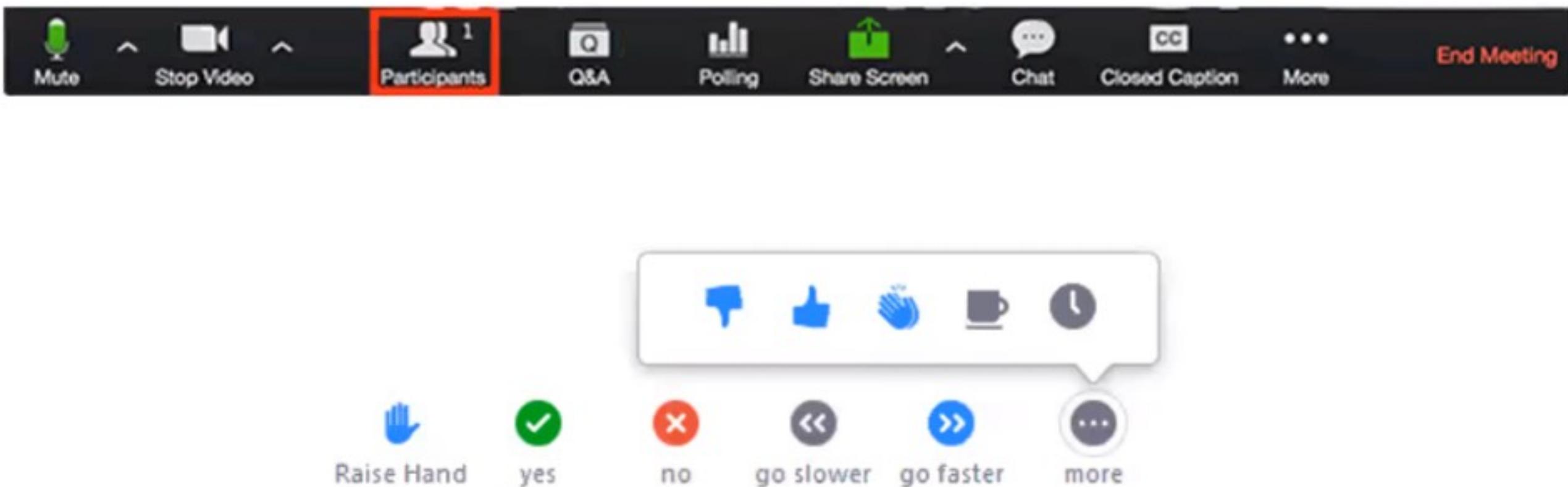
Find a participant

Participant	Microphone	Video
Miroslav Reiter (Me)		

Raise Hand      yes      no      go slower      go faster      more

Invite      Mute Me

# Používame Zoom



[Home](#) » Štatistika v R - Základy

## Štatistika v R - Základy

R je voľne šíritelný softvérový nástroj pre štatistické výpočty a grafickú vizualizáciu. Týmto jediným písmenom sa označuje prostredie i programovací jazyk zároveň. Na kurze sa budeme venovať programovaniu v programovacom jazyku R ako aj niektorým základným štatistickým metódam.

### 1. Základné informácie

- Úvod do R
- Inštalácia R, RStudio
- Vlastnosti jazyka R

### 2. Stručný prehľad programovania v R:

- Základná syntax
- Príkazy v R
- Dátové typy
- Premenné
- Operátory a konštandy
- Riadiace štruktúry
- Slučky
- Funkcie
- Reťazce
- Vektory
- Zoznamy

### 3. Štatistické výhodnotenie dát v R:

- Priemer, Medián, Modus
- Lineárna Regresia
- Normálne rozdelenie
- Kovariancia

# Vaše ciele a očakávania

1. Základy jazyka R

2. Základy analytického/štatistického myslenia

3. Základy programovania

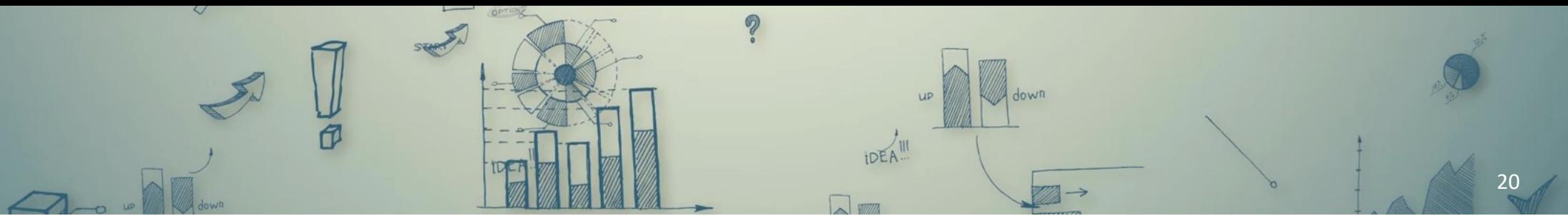
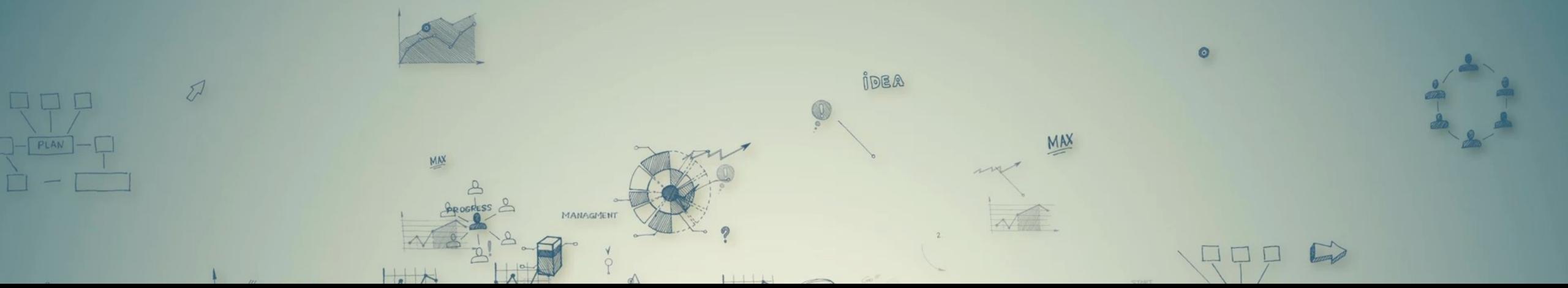
4. Základy s knižnicami

5. Základy práce s vývojovými nástrojmi pre jazyk R

Zábava je v zaručená v každom bode :-)



# Čo je jazyk R?



# Čo je R?

Programovací jazyk (implementácia jazyka S)



Prostredie pre štatistickú analýzu dát a ich grafické  
zobrazenie

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R is a programming language for statistical computing and graphics supported by the R Core Team and the R Foundation for Statistical Computing. Created by statisticians Ross Ihaka and Robert Gentleman, R is used among [data miners](#), [bioinformaticians](#) and [statisticians](#) for [data analysis](#) and developing [statistical software](#).<sup>[6]</sup> Users have created packages to augment the functions of the R language.

According to user surveys and studies of scholarly literature databases, R is one of the most commonly used programming languages used in data mining.<sup>[7]</sup> As of October 2022, R ranks 12th in the [TIOBE index](#), a measure of programming language popularity, in which the language peaked in 8th place in August 2020.<sup>[8][9]</sup>

The official R software environment is an open-source free software environment within the [GNU package](#), available under the [GNU General Public License](#). It is written primarily in C, Fortran, and R itself (partially [self-hosting](#)). Precompiled [executables](#) are provided for various [operating systems](#). R has a [command line interface](#).<sup>[10]</sup> Multiple third-party [graphical user interfaces](#) are also available, such as [RStudio](#), an [integrated development environment](#), and [Jupyter](#), a notebook interface.

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- 1 History
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- 6 Implementations
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  - 12.3 Modeling and plotting
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- 13 See also
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R terminal

<b>Paradigms</b>	Multi-paradigm: procedural, object-oriented, functional, reflective, imperative, array <sup>[1]</sup>
<b>Designed by</b>	Ross Ihaka and Robert Gentleman
<b>Developer</b>	R Core Team
<b>First appeared</b>	August 1993; 29 years ago
<b>Stable release</b>	4.2.2 <sup>[2]</sup> / 31 October 2022; 6 days ago
<b>Typing discipline</b>	Dynamic
<b>Platform</b>	arm64 and x86-64
<b>License</b>	GNU GPL v2
<b>Filename extensions</b>	.r <sup>[3]</sup> .rdata .rds .rda <sup>[4]</sup>
<b>Website</b>	<a href="http://www.r-project.org">www.r-project.org</a> ↗
<b>Influenced by</b>	

[Všetko](#)[Obrázky](#)[Videá](#)[Správy](#)[Nákupy](#)[Viac](#)[Nástroje](#)

Približne 15 540 000 000 výsledkov (0,59 sekundy)

<https://en.wikipedia.org> › wiki › S... ▾ Preložiť túto stránku

## S (programming language) - Wikipedia

S is a statistical programming **language** developed primarily by John Chambers and (in earlier versions) Rick Becker and Allan Wilks of Bell Laboratories.

First appeared: 1976; 46 years ago

<https://www.immagic.com> › GENERAL › WIKIPEDI [PDF](#)

## S (programming language)

DR Becker — S is a statistical programming **language** developed primarily by John Chambers and (in earlier versions) Rick Becker and Allan Wilks of Bell Laboratories.

3 strany

<https://en.bmstu.wiki> › S\_(program... ▾ Preložiť túto stránku

## S (programming language) - Bauman National Library

S-lang - script programming **language** that supports operations on arrays. S is a **language** and system for organizing, visualizing, and analyzing data.

<https://link.springer.com> › chapter · Preložiť túto stránku

**S** Programovací jazyk



Preložené z angličtiny - S je štatistický programovací jazyk vyvinutý predovšetkým Johnom Chambersom a Rickom Beckerom a Allanom Wilksom z Bell Laboratories. Cieľom jazyka, ako ho vyjadril John Chambers, je „rýchlo a verne premeniť nápady na softvér“. Moderná implementácia S je R, súčasť projektu slobodného softvéru GNU.

[Wikipédia \(angličtina\)](#)

Zobraziť pôvodný popis ▾

Spätná väzba



# S (programming language)

From Wikipedia, the free encyclopedia

**S** is a statistical programming language developed primarily by [John Chambers](#) and (in earlier versions) Rick Becker and Allan Wilks of [Bell Laboratories](#). The aim of the language, as expressed by John Chambers, is "to turn ideas into software, quickly and faithfully".<sup>[1]</sup>

The modern implementation of S is [R](#), a part of the [GNU](#) free software project. [S-PLUS](#), a commercial product, was formerly sold by [TIBCO Software](#).<sup>[citation needed]</sup>

## Contents [hide]

- 1 History
  - 1.1 "Old S"
  - 1.2 "New S"
  - 1.3 S4
- 2 References
- 3 External links

## History [edit]

### "Old S" [edit]

S is one of several statistical computing languages that were designed at Bell Laboratories, and first took form between 1975–1976.<sup>[2]</sup> Up to that time, much of the statistical computing was done by directly calling [Fortran](#) subroutines; however, S was designed to offer an alternate and more interactive approach, motivated in part by [exploratory data analysis](#) advocated by [John Tukey](#).<sup>[2]</sup> Early design decisions that hold even today include interactive graphics devices (printers and character terminals at the time), and providing easily accessible documentation for the functions.

The first working version of S was built in 1976, and operated on the [GCOS](#) operating system. At this time, S was unnamed, and suggestions included */SCS* (*Interactive SCS*), *SCS* (*Statistical Computing System*), and *SAS* (*Statistical Analysis System*) (which was already taken: see [SAS System](#)). The name 'S' (used with single quotation marks until 1979) was chosen, as it was a common letter in the suggestions and consistent with other programming languages designed from the same institution at the time (namely the [C programming language](#)).<sup>[2]</sup>

When [UNIX/32V](#) was ported to the (then new) 32-bit [DEC VAX](#), computing on the [Unix](#) platform became feasible for S. In late 1979, S was ported from GCOS to UNIX, which would

**S**

<b>Paradigm</b>	multi-paradigm: imperative, object oriented
<b>Developer</b>	Rick Becker, Allan Wilks, John Chambers
<b>First appeared</b>	1976; 46 years ago
<b>Typing discipline</b>	dynamic, strong
<b>License</b>	depends on implementation
<b>Website</b>	<a href="http://ect.bell-labs.com/sl/S/">ect.bell-labs.com/sl/S/</a> at the <a href="#">Wayback Machine</a> (archived 2018-10-14)
<b>Major implementations</b>	<a href="#">R</a> , <a href="#">S-PLUS</a>
<b>Influenced by</b>	<a href="#">C</a> , <a href="#">APL</a> , <a href="#">PPL</a> , <a href="#">Fortran</a>

# Slabotypový programovací jazyk

# Čo je R?

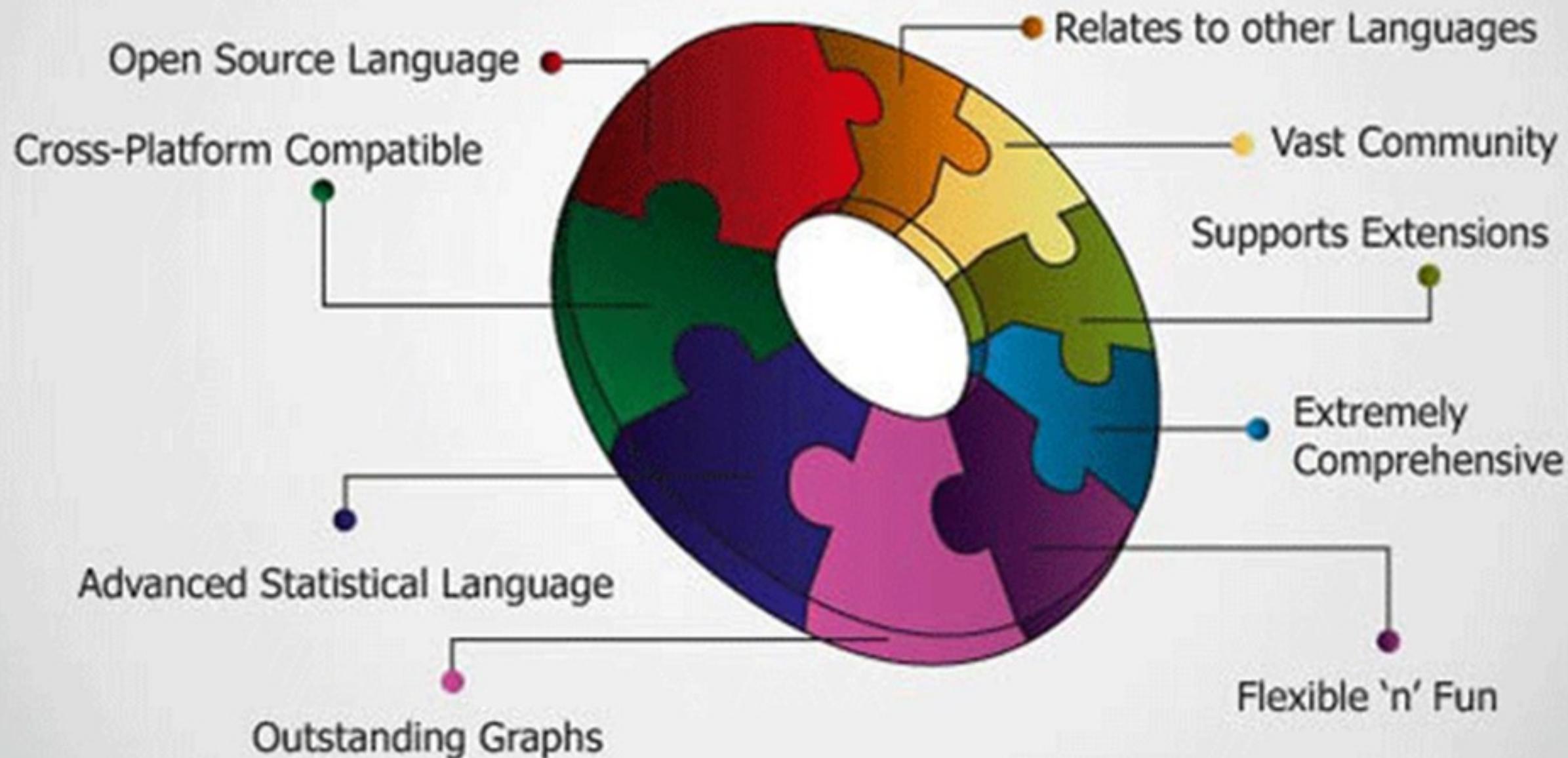


R terminal

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<b>Filename extensions</b>	.r <sup>[3]</sup> .rdata .rds .rda <sup>[4]</sup>
<b>Website</b>	<a href="http://www.r-project.org">www.r-project.org</a> ↗



# Why Learn R?



parallel processing  
logistic regression  
MapReduce random forest  
support vector machines

cassandra  
decision tree  
pig  
hive  
matlab  
oracle  
ruby  
NLP  
SPSS  
spark  
java  
optimization

communication skills  
**predictive**

statistics segmentation

SQL R hadoop

machine learning

forecasting  
regression  
scala

NoSQL  
SAS mahout  
scalable kafka

python stata  
perl

computer science

data visualization neural network

classification clustering excel

C/C++

Amazon Web Services  
external data text mining



# Aké IDE/editor mám použiť?



jupyterhub



ANACONDA®

Integrated development environment

# Chceme úplne všetko!

---



Individual Edition is now

# ANACONDA DISTRIBUTION

The world's most popular open-source Python distribution platform

### Anaconda Distribution

[Download !\[\]\(65f8ab2461b327e05559522983ac488f\_img.jpg\)](#)

For Windows  
Python 3.9 • 64-Bit Graphical Installer • 510 MB

Get Additional Installers





## Open Source

Access the open-source software you need for projects in any field, from data visualization to robotics.



## User-friendly

With our intuitive platform, you can easily search and install packages and create, load, and switch between environments.



## Trusted

Our securely hosted packages and artifacts are methodically tested and regularly updated.

# ANACONDA NAVIGATOR

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## Anaconda Notebooks

NEW!

Cloud notebooks with  
hundreds of packages  
ready to code

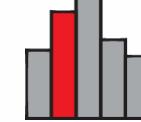
A full Python IDE directly  
from the browser

[Documentation](#)[Anaconda Blog](#)

Applications on

base (root)

Channels



1.0.0

Multidimensional data visualization across files. Explore relationships within and among related datasets.

[Install](#)

3.32.0

Component based data mining framework. Data visualization and data analysis for novice and expert. Interactive workflows with a large toolbox.

[Install](#)

PyCharm Professional

A full-fledged IDE by JetBrains for both Scientific and Web Python development. Supports HTML, JS, and SQL.

[Install](#)

RStudio

1.1.456

A set of integrated tools designed to help you be more productive with R. Includes R essentials and notebooks.



**rstudio** cannot be installed on this environment.

Do you want to install the package in an existing environment or  
create a new environment?

Name:

`rstudio`



Location: `C:\Users\Administrator\.conda\envs\rstudio`

Cancel

Create

[DOWNLOAD](#)

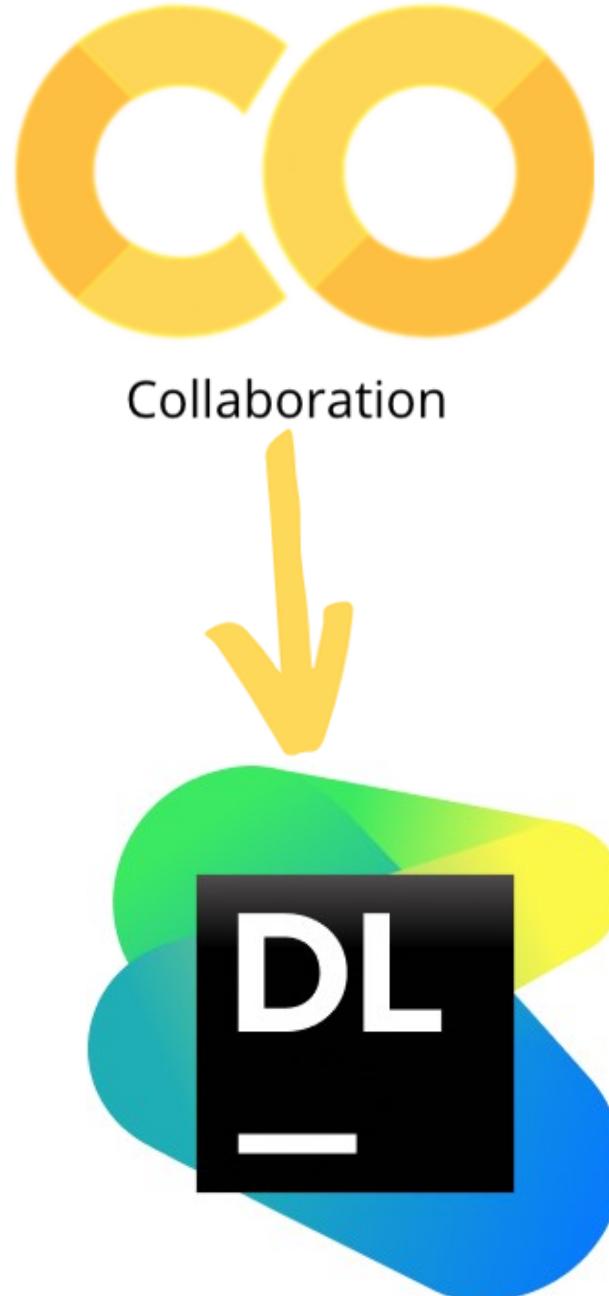
# Download RStudio Desktop

Used by millions of people weekly, the RStudio integrated development environment (IDE) is a set of tools built to help you be more productive with R and Python. It includes a console, syntax-highlighting editor that supports direct code execution. It also features tools for plotting, viewing history, debugging and managing your workspace.

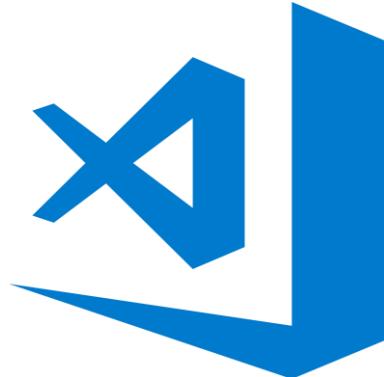
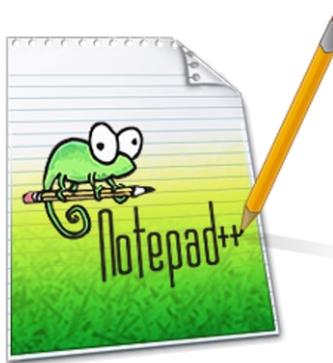
Select Your Operating System:



Flexibility



# Aký editor mám použiť?



```
:::  
iLE880j. :jD888880j:  
.LGitE888D.f8GjjjL8888E;  
iE :8888Et. .G8888.  
;i E888, ,8888,  
D888, :8888:  
D888, :8888:  
D888, :8888:  
D888, :8888:  
888W, :8888:  
W88W, :8888:  
W88W: :8888:  
DGGD: :8888:  
:8888:  
:W888:  
:8888:  
E888i  
tW88D
```



IDE ≠ editor

# Začiatky v R...

Problémy pri interpretovaní

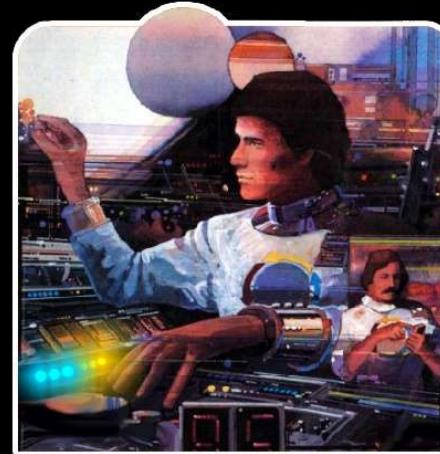
Syntaktické chyby

Sémantické chyby

Chybové hlásenia

Pluginy, balíčky

THE TWO STATES OF  
EVERY PROGRAMMER



I AM A GOD.



I HAVE NO IDEA  
WHAT I'M DOING.

@georgejdr

Press Ctrl + Enter to start journey

# Najdôležitejšie klávesové skratky

## Práca s IDE

- Ctrl + D Delete zmaž riadok
- **Ctrl + Space** Asistent kódu
- **Ctrl + /** Komentáre
- Ctrl + A Označ všetko
- **Alt + /** Dokonči slovo
- Ctrl + F Hľadanie a náhrady
- Ctrl + Shift + F Kompakt režim
- Ctrl + Shift + S Ulož všetko

## Práca s browserom

- Ctrl + T Vytvor nový tab
- Ctrl + W Zatvor aktuálny tab
- Ctrl + Shift + W Zatvor všetky taby
- **Ctrl + Shift + T** Otvor posledný tab
- Ctrl + Shift + J/F12 Web console
- **F11** Fullscreen

**F5 nie je spustenie, ale Refresh**



## 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 \(Debian, Fedora/Redhat, Ubuntu\)](#)
- [Download R for macOS](#)
- [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 (2022-10-31, Innocent and Trusting) [R-4.2.2.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](#).
- Contributed extension [packages](#)

## Questions About R

- If you have questions about R like how to download and install the software, or what the license terms are, please read our [answers to frequently asked questions](#) before you send an email.

## What are R and CRAN?

R is ‘GNU S’, a freely available language and environment for statistical computing and graphics which provides a wide variety of statistical and graphical techniques: linear and nonlinear modelling, statistical tests, time series analysis, classification, clustering, etc. Please consult the [R project homepage](#) for further information.

CRAN is a network of ftp and web servers around the world that store identical, up-to-date, versions of code and documentation for R. Please use the CRAN [mirror](#) nearest to you to minimize network load.

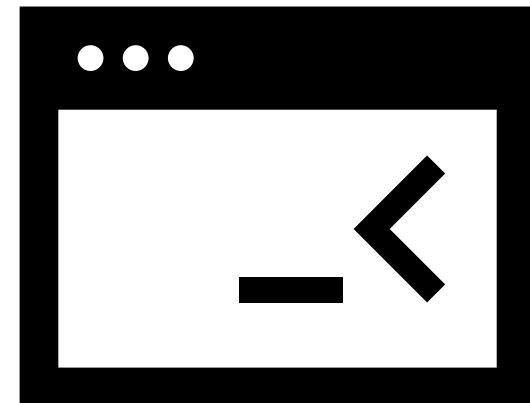
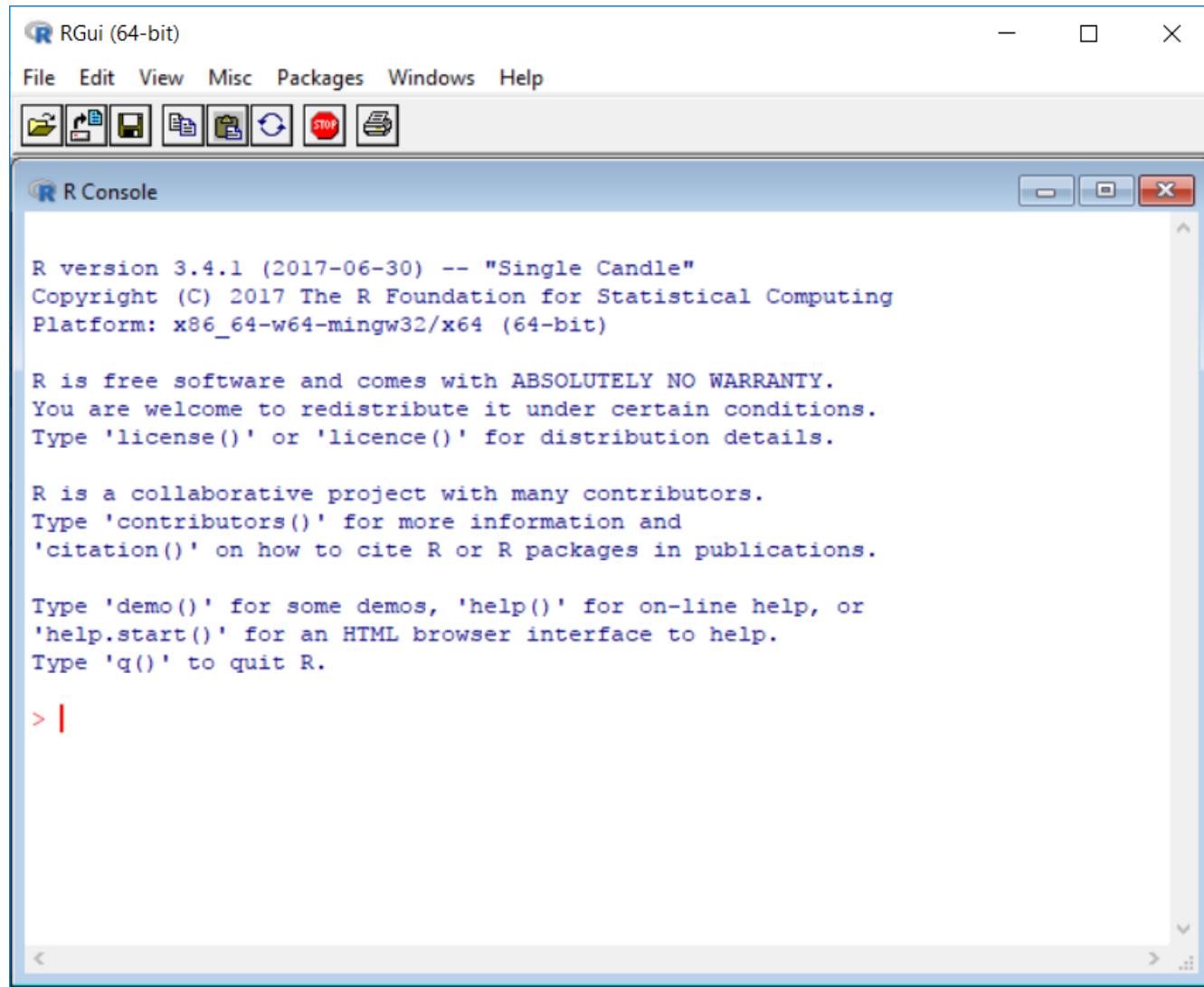
[CRAN](#)  
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# Používanie RGui



# Inštalácia RStudio



## RStudio Desktop 1.0.153 — Release Notes

RStudio requires R 2.11.1+. If you don't already have R, download it [here](#).

### Installers for Supported Platforms

Installers	Size	Date	MD5
RStudio 1.0.153 - Windows Vista/7/8/10	81.9 MB	2017-07-20	b3b4bbc82865ab105c21cb70b17271b3
RStudio 1.0.153 - Mac OS X 10.6+ (64-bit)	71.2 MB	2017-07-20	8773610566b74ec3e1a88b2fdb10c8b5
RStudio 1.0.153 - Ubuntu 12.04-15.10/Debian 8 (32-bit)	85.5 MB	2017-07-20	981be44f91fc07e5f69f52330da32659
RStudio 1.0.153 - Ubuntu 12.04-15.10/Debian 8 (64-bit)	91.7 MB	2017-07-20	2d0769bea2bf6041511d6901a1cf69c3
RStudio 1.0.153 - Ubuntu 16.04+/Debian 9+ (64-bit)	61.9 MB	2017-07-20	d584cbab01041777a15d62cbef69a976
RStudio 1.0.153 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (32-bit)	84.7 MB	2017-07-20	8dfee96059b05a063c49b705eca0ceb4
RStudio 1.0.153 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (64-bit)	85.7 MB	2017-07-20	16c2c8334f961c65d9bfa8fb813ad7e7

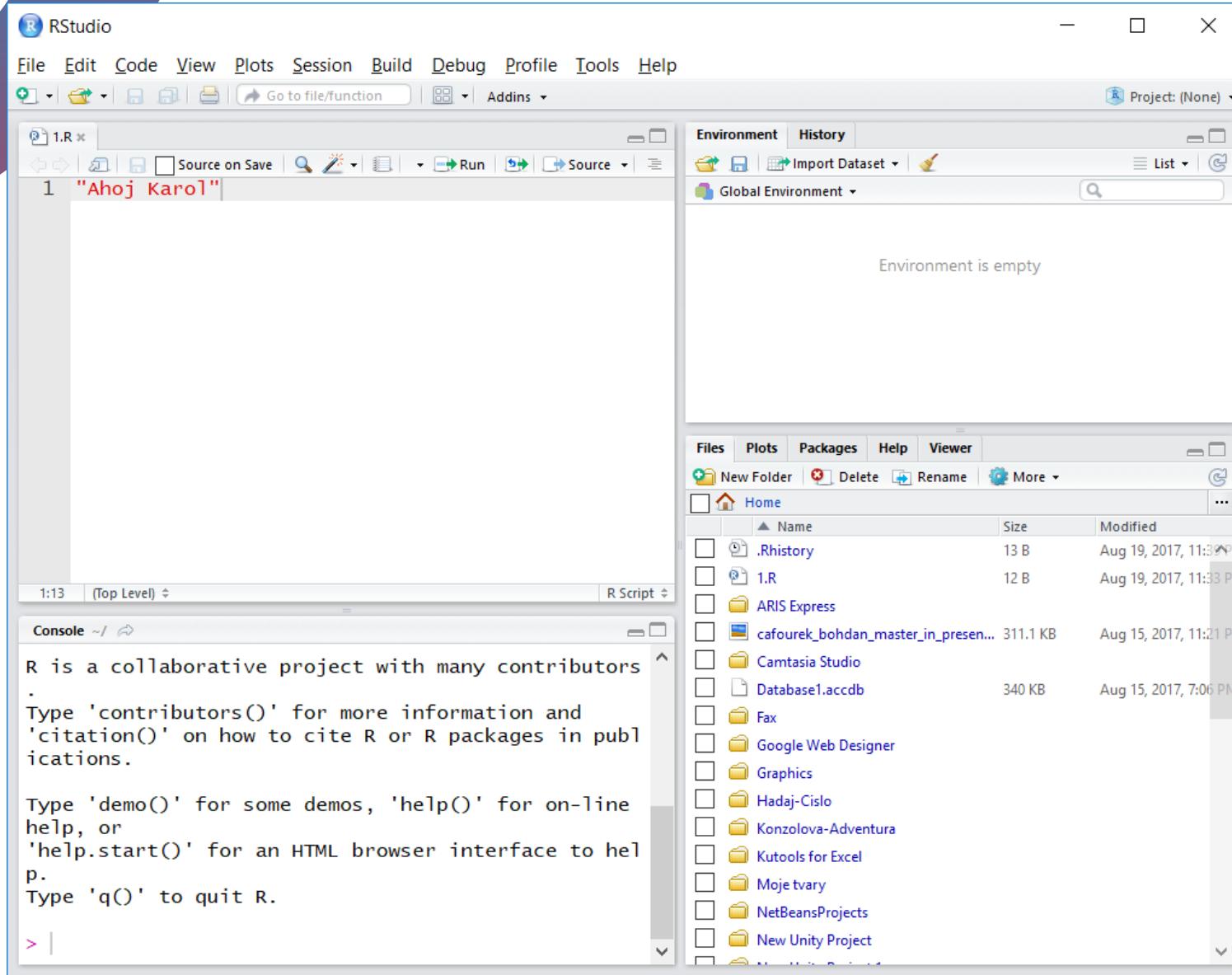
### Zip/Tarballs

Zip/tar archives	Size	Date	MD5
RStudio 1.0.153 - Windows Vista/7/8/10	117.6 MB	2017-07-20	024b5714fa6ef337fe0c6f5e2894cbc
RStudio 1.0.153 - Ubuntu 12.04-15.10/Debian 8 (32-bit)	86.2 MB	2017-07-20	f8e0ffa7ec62665524f9e2477facd346
RStudio 1.0.153 - Ubuntu 12.04-15.10/Debian 8 (64-bit)	92.7 MB	2017-07-20	2077c181311d1aad6fb8d435f8f1f45f
RStudio 1.0.153 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (32-bit)	85.4 MB	2017-07-20	92e1a22d14952273ec389e5a55be614f
RStudio 1.0.153 - Fedora 19+/RedHat 7+/openSUSE 13.1+ (64-bit)	86.6 MB	2017-07-20	0b71c5a7fc53c84b3fe67242240b3531

### Source Code

A tarball containing source code for RStudio v1.0.153 can be downloaded from [here](#)

# Používanie RStudio



# Visual Studio

## Products

### Available

#### Visual Studio Community 2017

15.3.1

Free, fully-featured IDE for students, open-source and individual developers

[License terms](#) | [Release notes](#)

[Install](#)

#### Visual Studio Enterprise 2017

15.3.1

Microsoft DevOps solution for productivity and coordination across teams of any size

[License terms](#) | [Release notes](#)

[Install](#)

#### Visual Studio Professional 2017

15.3.1

Professional developer tools and services for small teams

[License terms](#) | [Release notes](#)

[Install](#)

### Welcome!

We invite you to go online to hone your skills and find additional tools to support your development workflow.

#### Learn

Whether you're new to development or an experienced developer, we have you covered with our tutorials, videos, and sample code.

#### Marketplace

Use Visual Studio extensions to add support for new technologies, integrate with other products and services, and fine-tune your experience.

### Need some help?

Check out the [Microsoft Developer Community](#) where developers provide feedback and answers to many common problems.

Get help from Microsoft at [Visual Studio Support](#).

# Inštalácia Visual Studio

# Úloha (Import dát a Balíčky)

The screenshot shows the RStudio interface with two main panes. The left pane is the 'Code' editor containing R code. The right pane is the 'Environment' browser.

**Code Editor (Hello.R\*):**

```
1
2
3
4
5
6 mojeData <- read.csv(file.choose())
7
8 install.packages("ggplot2")
9
10 ggplot(data = mojeData, aes(x=carat, y=price, colour=clarity))
11 #geom_point(alpha=0.1)
12
13
```

Two red arrows point from the code to the 'mojeData' assignment and the 'ggplot2' package installation line respectively.

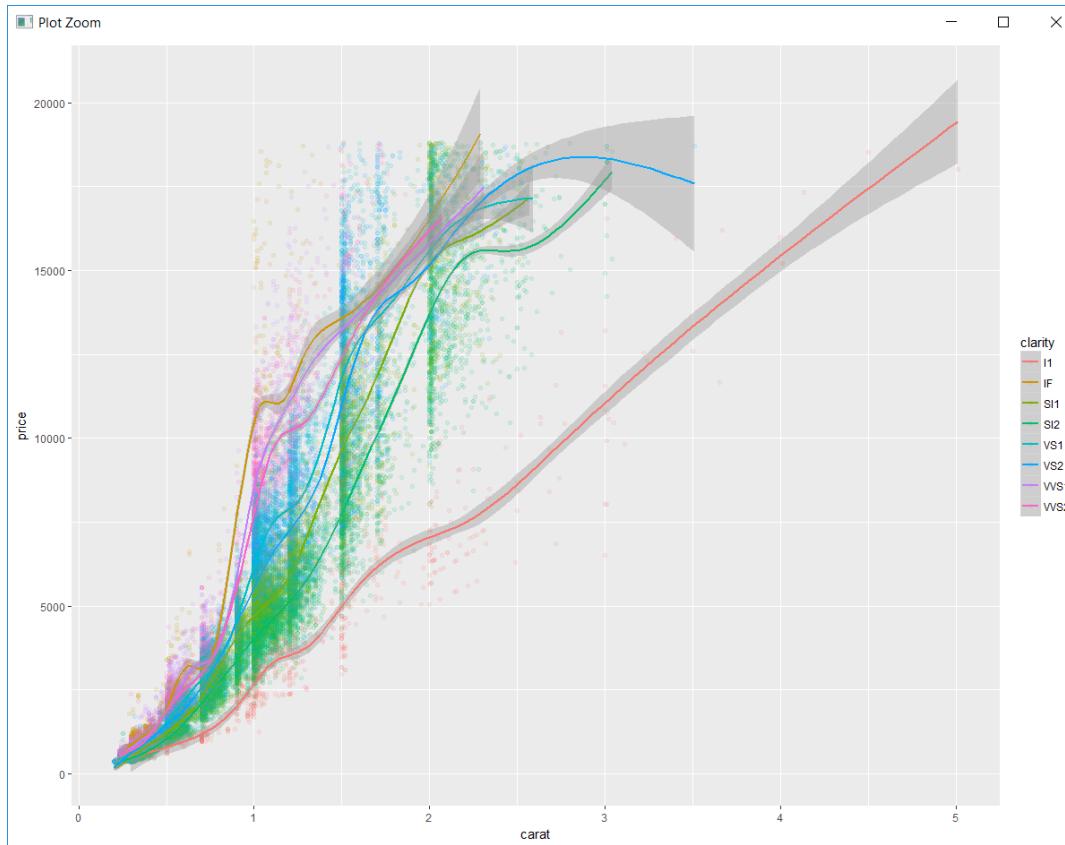
**Environment Browser (Data tab):**

mojeData	53940 obs. of 3 variables
----------	---------------------------

**Packages Tab:**

Name	Description	Version
dplyr	A Grammar of Data Manipulation	0.7.2
Formula	Extended Model Formulas	1.2-2
<input checked="" type="checkbox"/> ggplot2	Create Elegant Data Visualisations Using the Grammar of Graphics	2.2.1
glue	Interpreted String Literals	1.1.1
gttable	Arrange 'Grobs' in Tables	0.2.0
labeling	Axis Labeling	0.3
lazyeval	Lazy (Non-Standard) Evaluation	0.2.0

# Inštalácia packages

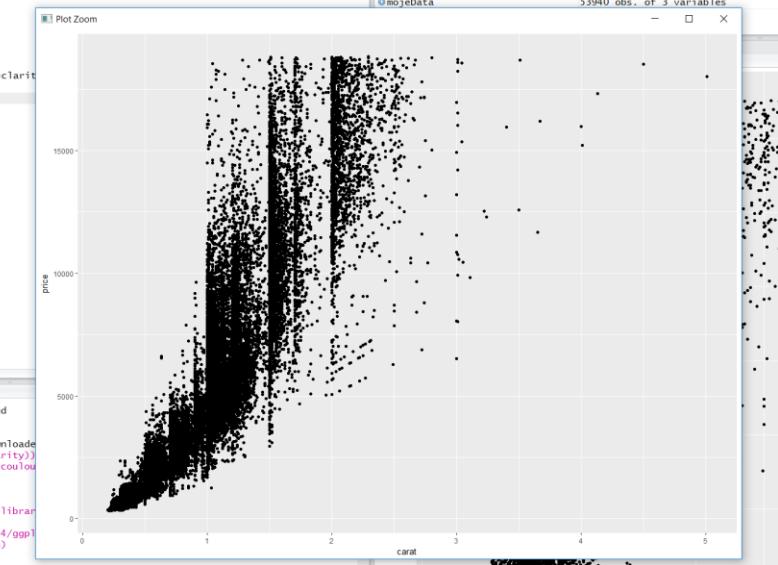


RStudio interface showing the installation of the `ggplot2` package. The code in the console is:

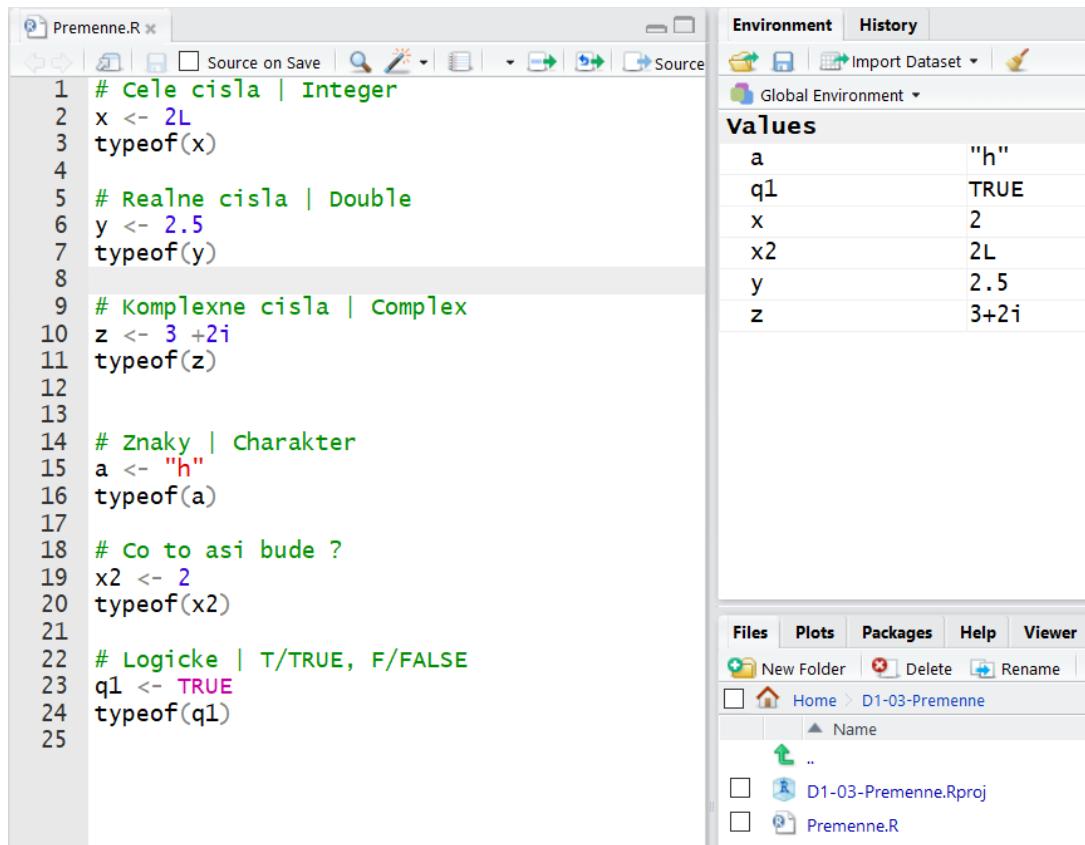
```
mojeData <- read.csv(file.choose())
install.packages("ggplot2")
ggplot(data = mojeData, aes(x=carat, y=price, colour=clarity))
```

The output in the console shows the package was successfully unpacked and MD5 sums checked, and lists the downloaded binary packages. However, it ends with an error message:

```
Error in ggplot(data = mojeData, aes(x = carat, y = price, colour = clarity)) :
  could not find function "ggplot"
```



# Premenné v R

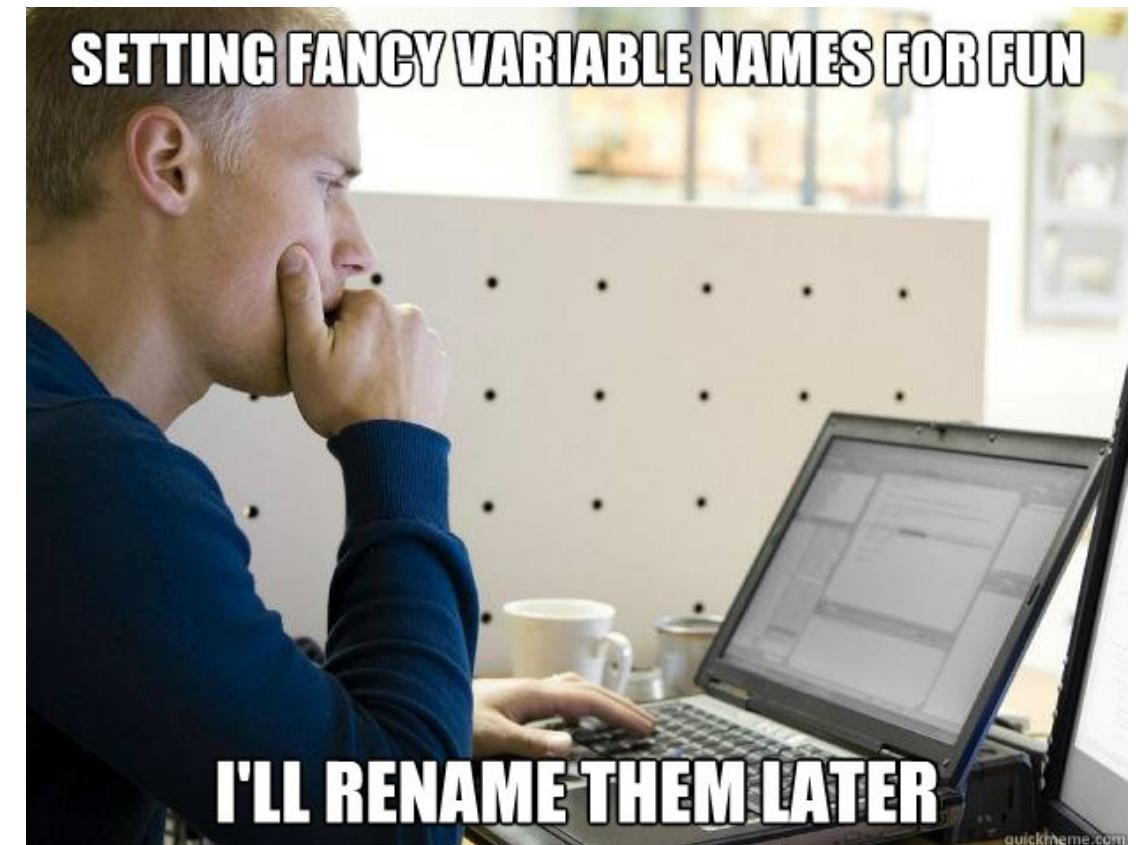


The screenshot shows the RStudio interface. On the left, the code editor displays a script named 'Premenne.R' with the following content:

```
1 # Cele cisla | Integer
2 x <- 2L
3 typeof(x)
4
5 # Realne cisla | Double
6 y <- 2.5
7 typeof(y)
8
9 # Komplexne cisla | Complex
10 z <- 3+2i
11 typeof(z)
12
13
14 # Znaky | Charakter
15 a <- "h"
16 typeof(a)
17
18 # Co to asi bude ?
19 x2 <- 2
20 typeof(x2)
21
22 # Logicke | T/TRUE, F/FALSE
23 q1 <- TRUE
24 typeof(q1)
```

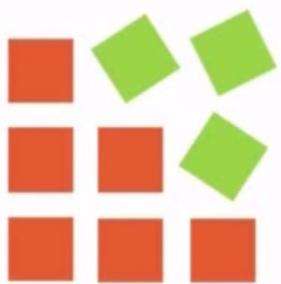
The right side of the interface shows the 'Environment' tab of the global environment pane, listing variables and their values:

Values	
a	"h"
q1	TRUE
x	2
x2	2L
y	2.5
z	3+2i



# R objekty/premenné

## Basic Classes of Objects



### Atomic Classes

#### Character

"A", "c"

#### Numeric

4.36, 7.42

#### Integer

3,5

#### Logical

True, False

#### Complex

1 + 7i , 8 - 2i

## Názvy premenných

- Začínajú znakom, alebo podtrhovníkom
- Záleží v názvoch na veľkosti písmen (napr. tmpstr, tmpStr a Tmpstr sú rôzne premenné)
- Obsahujú znaky a-z, A-Z, 0-9 a podtrhovník
- Nesmú obsahovať medzery

# Atomické vektory

- Commonly known as **vectors**
- **Homogeneous** data structure

Character vector	Numeric vector	Integer vector	Logical vector	Complex vector
{ "A", "c" }	{ 4.36, 7.42 }	{ 3,5 }	{ True, False }	{ 1 + 7i , 8 - 2i }

# Kontrola dát. typov

```
1. # R internal type or storage  
mode of any object  
2. typeof(1) # "double"  
  
3. # Object class  
4. class(2) # "numeric"  
  
5. # Set or get the storage mode  
or type of an R object  
6. # This classification is  
related to the S language  
7. storage.mode(3) # "double"  
8. mode(4) # "numeric"  
  
9. # Object structure  
10. str(5) # num 5
```

typeof	storage.mode	mode
logical	logical	logical
integer	numeric	integer
double	numeric	double
complex	complex	complex
character	character	character

# Zabudované konštanty

```
> month
Error: object 'month' not found
> month.abb
[1] "Jan" "Feb" "Mar" "Apr" "May" "Jun" "Jul" "Aug" "Sep" "Oct" "Nov" "Dec"
> month.name
[1] "January"    "February"   "March"      "April"       "May"        "June"       "July"
[8] "August"      "September"  "October"    "November"   "December"
> month.abb[1]
[1] "Jan"
> month.abb[1:6]
[1] "Jan" "Feb" "Mar" "Apr" "May" "Jun"
> month.abb[c(1,3,5)]
[1] "Jan" "Mar" "May"
> month.abb[c(1:5)]
[1] "Jan" "Feb" "Mar" "Apr" "May"
> pi
[1] 3.141593
> letters
[1] "a" "b" "c" "d" "e" "f" "g" "h" "i" "j" "k" "l" "m" "n" "o" "p" "q" "r" "s" "t" "u" "v"
[23] "w" "x" "y" "z"
> LETTERS
[1] "A" "B" "C" "D" "E" "F" "G" "H" "I" "J" "K" "L" "M" "N" "O" "P" "Q" "R" "S" "T" "U" "V"
[23] "W" "X" "Y" "Z"
>
```

## Zoznam premenných

```
> ls(all.names = T)
[1] ".Random.seed"      "a"           "A"           "B"
[5] "c"                 "jeskladom"    "komplexnecislo" "meno"
[9] "menospolocnosti"   "mzdazamestnanca" "priezvisko"   "sprava"
[13] "vekklienta"        "vysledok"     "x2"          "x3"
> ls(all.names = T,sorted = T)
[1] ".Random.seed"      "a"           "A"           "B"
[5] "c"                 "jeskladom"    "komplexnecislo" "meno"
[9] "menospolocnosti"   "mzdazamestnanca" "priezvisko"   "sprava"
[13] "vekklienta"        "vysledok"     "x2"          "x3"
> ls(all.names = T,sorted = F)
[1] "sprava"            "jeskladom"    "A"           "B"
[5] "c"                 "vysledok"     "a"           "komplexnecislo"
[9] "meno"               ".Random.seed"  "mzdazamestnanca" "priezvisko"
[13] "vekklienta"        "menospolocnosti" "x2"          "x3"
> ls(all.names = T,sorted = T, pattern = "a")
[1] ".Random.seed"      "a"           "jeskladom"    "mzdazamestnanca"
[5] "sprava"            "vekklienta"
> ls(all.names = T,sorted = T, pattern = "m*")
[1] ".Random.seed"      "a"           "A"           "B"
[5] "c"                 "jeskladom"    "komplexnecislo" "meno"
[9] "menospolocnosti"   "mzdazamestnanca" "priezvisko"   "sprava"
[13] "vekklienta"        "vysledok"     "x2"          "x3"
```

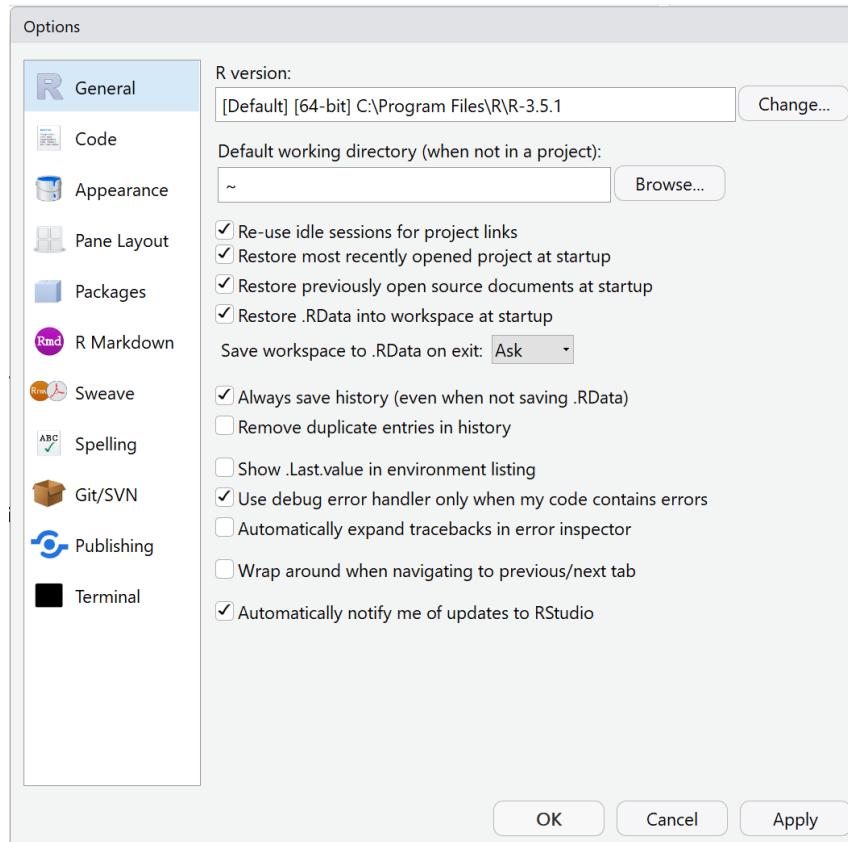
Príkaz ls() | objects()

# Zoznam objektov a funkcií

```
> ls(all.names = T)
[1] ".Random.seed"      "a"           "A"           "B"
[5] "C"                  "jeskladom"    "komplexneCislo" "meno"
[9] "menospolocnosti"   "mzdazamestnanca" "priezvisko"   "sprava"
[13] "vekklienta"        "vysledok"     "x2"          "x3"
> ls(all.names = T,sorted = T)
[1] ".Random.seed"      "a"           "A"           "B"
[5] "C"                  "jeskladom"    "komplexneCislo" "meno"
[9] "menospolocnosti"   "mzdazamestnanca" "priezvisko"   "sprava"
[13] "vekklienta"        "vysledok"     "x2"          "x3"
> ls(all.names = T,sorted = F)
[1] "sprava"            "jeskladom"    "A"           "B"
[5] "C"                  "vysledok"     "a"           "komplexneCislo"
[9] "meno"               ".Random.seed"  "mzdazamestnanca" "priezvisko"
[13] "vekklienta"        "menospolocnosti" "x2"          "x3"
> ls(all.names = T,sorted = T, pattern = "a")
[1] ".Random.seed"      "a"           "jeskladom"    "mzdazamestnanca"
[5] "sprava"            "vekklienta"
> ls(all.names = T,sorted = T, pattern = "m*")
[1] ".Random.seed"      "a"           "A"           "B"
[5] "C"                  "jeskladom"    "komplexneCislo" "meno"
[9] "menospolocnosti"   "mzdazamestnanca" "priezvisko"   "sprava"
[13] "vekklienta"        "vysledok"     "x2"          "x3"
```

Príkaz `builtins()` | `ls(baseenv(), all = TRUE)`

# Nastavenia R a Rstudio



```
> options()
$`add.smooth`
[1] TRUE

$askpass
function (prompt)
{
  .call("rs_askForPassword", prompt)
}
<environment: 0x00000000dd60a00>

$askYesNo
function (msg, ...)
{
  flush.console()
  ans <- winDialog("yesnocancel", msg)
  switch(ans, YES = TRUE, NO = FALSE, NA)
}
<bytecode: 0x00000000d317000>
<environment: namespace:utils>
```

options(max.print=5000)

# Dátové štruktúry

## Homogénne typy

- Rovnaké typy položiek
  - Atomické vektory (Vectors)
  - Matice (Matrices)
  - Polia (Arrays)

## Heterogénne typy

- Rôzne typy položiek
  - Zoznamy (Lists)
  - Dátové rámce (DataFrames)

# Ďalšie dátové typy

## Matice alebo polia

- Sú viacozmerné zovšeobecnenia vektorov
- V skutočnosti sú to vektory, ktoré môžu byť indexované dvomi alebo viacerými indexmi

## Faktory

- Kompaktné spôsoby spracovania kategorických údajov

## Zoznamy

- Všeobecná forma vektora, v ktorej rôzne prvky nemusia byť rovnakého typu a sú často samotné vektory alebo zoznamy

## Dátové rámce

- Sú maticové štruktúry, v ktorých môžu byť stĺpce rôznymi typmi
- Premýšľajte o dátových rámcoch ako o "dátových maticiach,, tabuľkách

## Funkcie

- Sú samotné objekty v R, ktoré môžu byť uložené v pracovnom priestore projektu

# Konverzie dát

	<b>to one long vector</b>	<b>to matrix</b>	<b>to data frame</b>
<b>from vector</b>	<code>c(x,y)</code>	<code>cbind(x,y)</code> <code>rbind(x,y)</code>	<code>data.frame(x,y)</code>
<b>from matrix</b>	<code>as.vector(mymatrix)</code>		<code>as.data.frame(mymatrix)</code>
<b>from data frame</b>		<code>as.matrix(myframe)</code>	

# Dátumy

```
# use as.Date( ) to convert strings to dates  
mydates <- as.Date(c("2007-06-22", "2004-02-13"))  
# number of days between 6/22/07 and 2/13/04  
days <- mydates[1] - mydates[2]
```

```
# print today's date  
today <- Sys.Date()  
format(today, format="%B %d %Y")  
"June 20 2007"
```

# Formátovanie dátumy

Symbol	Meaning	Example
%d	day as a number (0-31)	01-31
%a	abbreviated weekday	Mon
%A	unabbreviated weekday	Monday
%m	month (00-12)	00-12
%b	abbreviated month	Jan
%B	unabbreviated month	January
%y	2-digit year	07
%Y	4-digit year	2007

# Konverzie dátumy

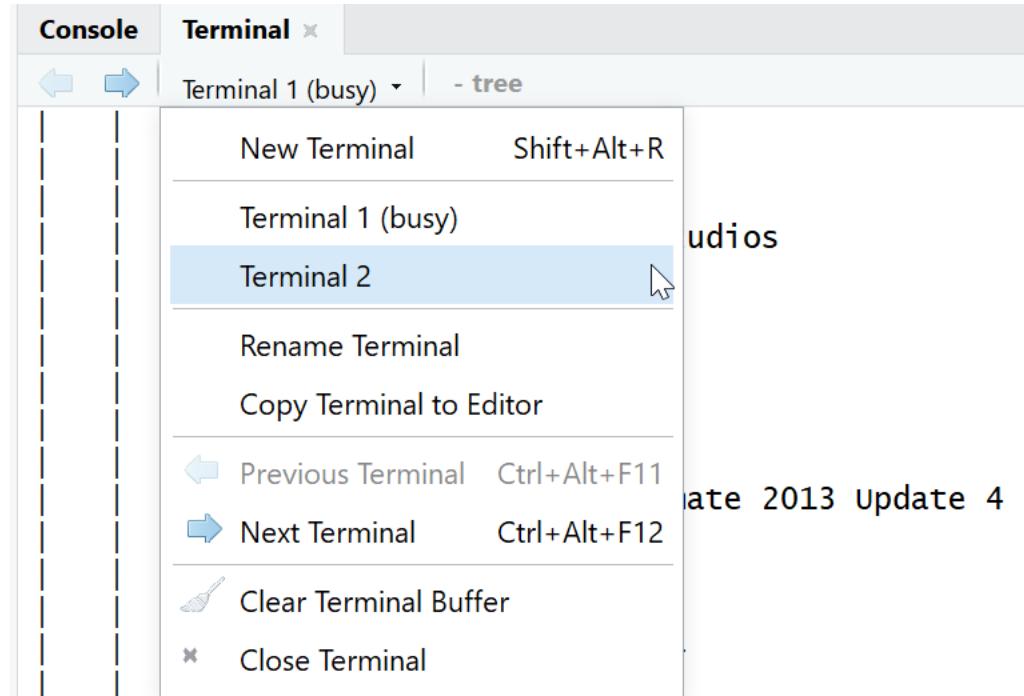
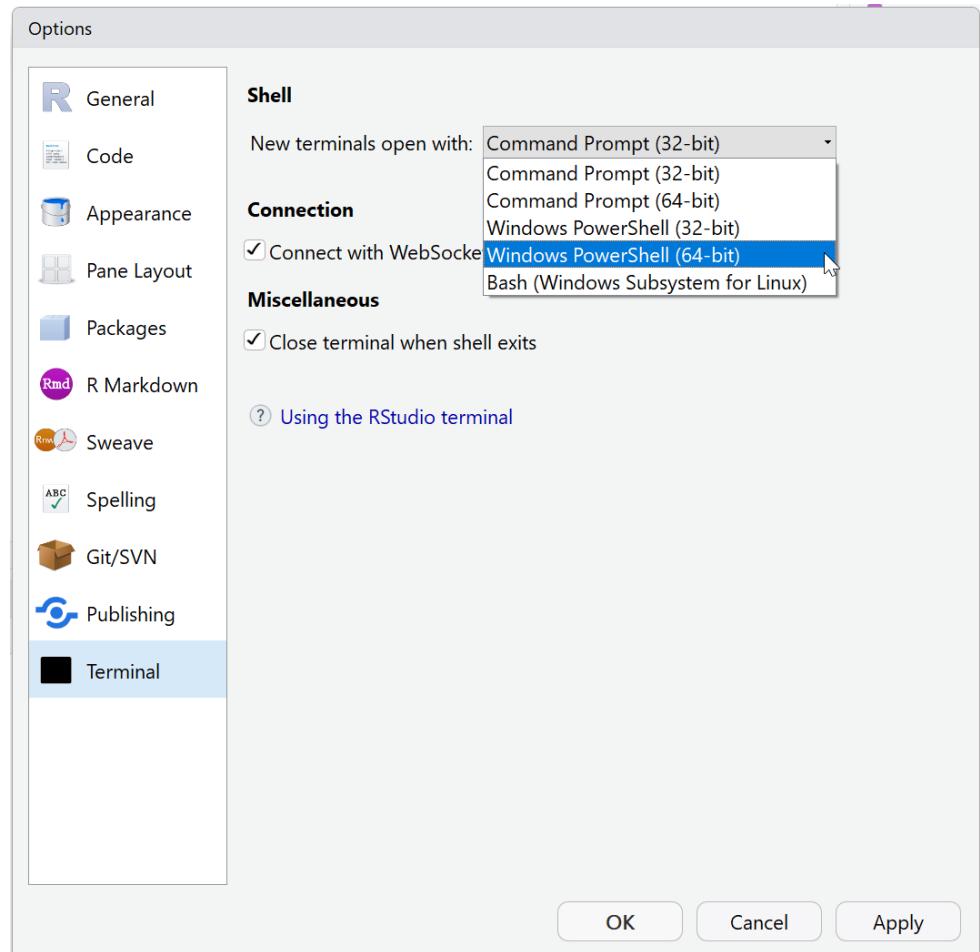
```
# convert date info in format 'mm/dd/yyyy'  
strDates <- c("01/05/1965", "08/16/1975")  
dates <- as.Date(strDates, "%m/%d/%Y")
```

```
mydates <- as.Date(c("2007-06-22", "2004-02-13"))
```

```
# convert dates to character data  
strDates <- as.character(dates)
```

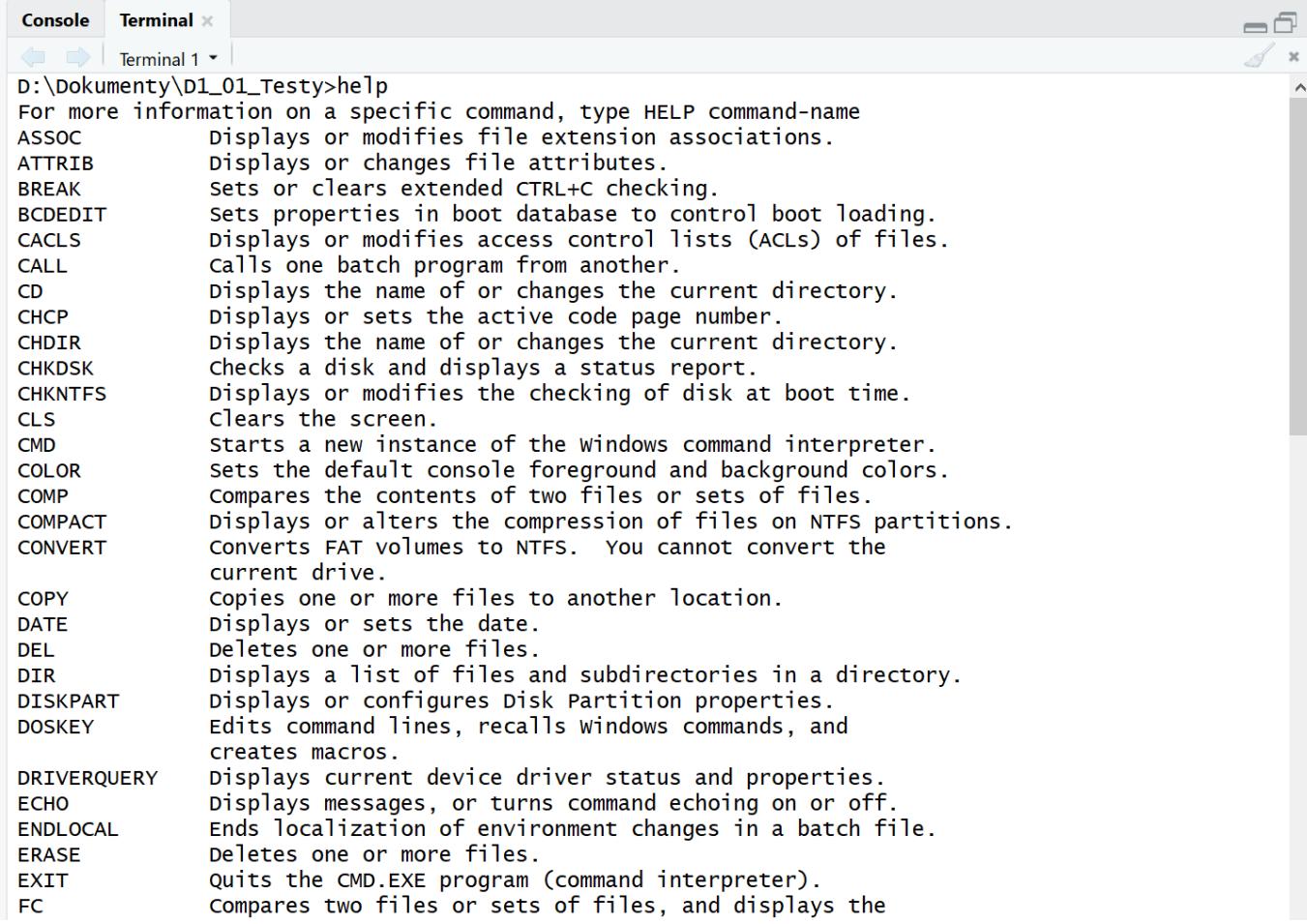
**default format yyyy-mm-dd**

# Terminal



Ctrl + I | cls | metla

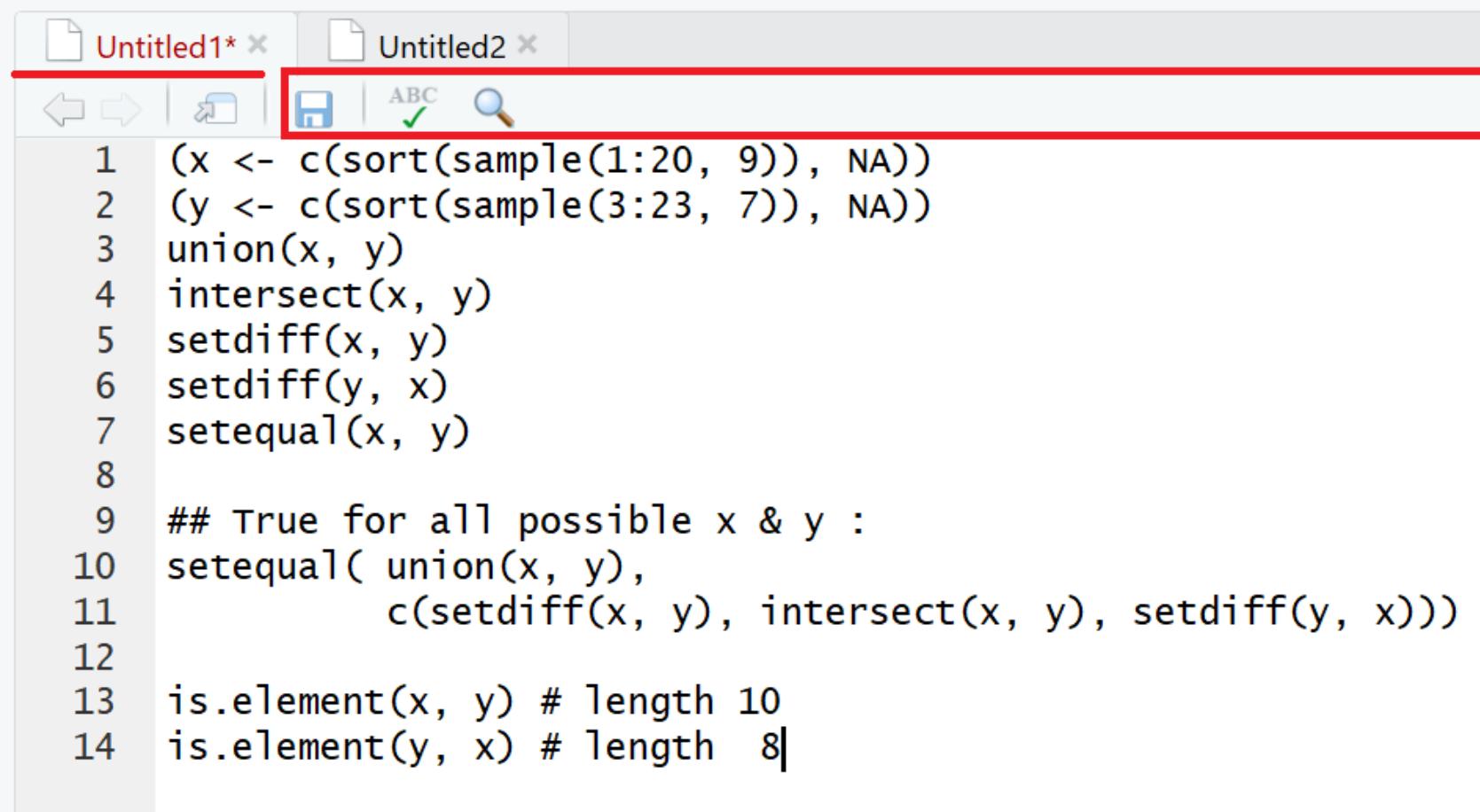
# Terminal



D:\Dokumenty\D1\_01\_Testy>help  
For more information on a specific command, type HELP command-name  
ASSOC Displays or modifies file extension associations.  
ATTRIB Displays or changes file attributes.  
BREAK Sets or clears extended CTRL+C checking.  
BCDEDIT Sets properties in boot database to control boot loading.  
CACLS Displays or modifies access control lists (ACLs) of files.  
CALL Calls one batch program from another.  
CD Displays the name of or changes the current directory.  
CHCP Displays or sets the active code page number.  
CHDIR Displays the name of or changes the current directory.  
CHKDSK Checks a disk and displays a status report.  
CHKNTFS Displays or modifies the checking of disk at boot time.  
CLS Clears the screen.  
CMD Starts a new instance of the Windows command interpreter.  
COLOR Sets the default console foreground and background colors.  
COMP Compares the contents of two files or sets of files.  
COMPACT Displays or alters the compression of files on NTFS partitions.  
CONVERT Converts FAT volumes to NTFS. You cannot convert the current drive.  
COPY Copies one or more files to another location.  
DATE Displays or sets the date.  
DEL Deletes one or more files.  
DIR Displays a list of files and subdirectories in a directory.  
DISKPART Displays or configures Disk Partition properties.  
DOSKEY Edits command lines, recalls Windows commands, and creates macros.  
DRIVERQUERY Displays current device driver status and properties.  
ECHO Displays messages, or turns command echoing on or off.  
ENDLOCAL Ends localization of environment changes in a batch file.  
ERASE Deletes one or more files.  
EXIT Quits the CMD.EXE program (command interpreter).  
FC Compares two files or sets of files, and displays the

Shift + Alt + R

# Prečo mi nejde spustiť skript?



The screenshot shows the RStudio interface with two tabs: "Untitled1\*" and "Untitled2". The "Untitled1\*" tab is active and contains the following R code:

```
1 (x <- c(sort(sample(1:20, 9)), NA))
2 (y <- c(sort(sample(3:23, 7)), NA))
3 union(x, y)
4 intersect(x, y)
5 setdiff(x, y)
6 setdiff(y, x)
7 setequal(x, y)
8
9 ## True for all possible x & y :
10 setequal( union(x, y),
11           c(setdiff(x, y), intersect(x, y), setdiff(y, x)))
12
13 is.element(x, y) # length 10
14 is.element(y, x) # length 8|
```

The code is intended to demonstrate set operations. Lines 1 through 7 show the creation of sets x and y, their union, intersection, and differences. Line 9 is a comment. Lines 10 through 12 show the use of the `setequal` function. Lines 13 and 14 check if elements of one set are in the other. The code has several syntax errors, particularly in line 10 where the closing parenthesis is missing.

C:\Users\miros\AppData\Local\RStudio-Desktop\log\rsession-miros.log - Notepad++

Súbor Úpravy Hľadat Zobrazenie Kódovanie Jazyk Nastavenia Nástroje Makro Spustiť Rozšírenia Okná ?

rsession-miros.log

```
9 07 Nov 2018 09:36:40 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : undefined is not an object (evaluating 'this.a.a.r.row');|||com/google/gwt/dev/jjs/intrinsic/com/goog
10 07 Nov 2018 09:36:40 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : undefined is not an object (evaluating 'this.a.a.r.row');|||com/google/gwt/dev/jjs/intrinsic/com/goog
11 07 Nov 2018 09:45:39 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
12 07 Nov 2018 09:45:40 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
13 07 Nov 2018 09:45:41 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
14 07 Nov 2018 09:45:42 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
15 07 Nov 2018 09:45:42 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
16 07 Nov 2018 09:45:43 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
17 07 Nov 2018 09:45:43 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
18 07 Nov 2018 09:45:44 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
19 07 Nov 2018 09:45:44 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
20 07 Nov 2018 09:45:44 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
21 07 Nov 2018 09:45:45 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
22 07 Nov 2018 09:45:46 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
23 07 Nov 2018 09:45:46 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
24 07 Nov 2018 09:46:13 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
25 07 Nov 2018 09:46:14 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
26 07 Nov 2018 11:03:47 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
27 07 Nov 2018 11:03:54 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
28 07 Nov 2018 11:04:33 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
29 07 Nov 2018 11:18:10 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/hiberfil.sys]; OCCURRED AT
30 07 Nov 2018 11:18:10 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/hiberfil.sys]; OCCURRED AT
31 07 Nov 2018 11:18:10 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/pagefile.sys]; OCCURRED AT
32 07 Nov 2018 11:18:10 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/pagefile.sys]; OCCURRED AT
33 07 Nov 2018 11:18:10 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/swapfile.sys]; OCCURRED AT
34 07 Nov 2018 11:18:10 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/swapfile.sys]; OCCURRED AT
35 07 Nov 2018 11:18:10 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/hiberfil.sys]; OCCURRED AT
36 07 Nov 2018 11:18:10 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/pagefile.sys]; OCCURRED AT
37 07 Nov 2018 11:18:11 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/swapfile.sys]; OCCURRED AT
38 07 Nov 2018 11:18:11 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/hiberfil.sys]; OCCURRED AT
39 07 Nov 2018 11:18:11 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/pagefile.sys]; OCCURRED AT
40 07 Nov 2018 11:18:11 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/swapfile.sys]; OCCURRED AT
41 07 Nov 2018 11:18:11 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/hiberfil.sys]; OCCURRED AT
42 07 Nov 2018 11:18:11 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/pagefile.sys]; OCCURRED AT
43 07 Nov 2018 11:18:11 [rsession-miros] ERROR system error 32 (The process cannot access the file because it is being used by another process) [path=C:/swapfile.sys]; OCCURRED AT
44 07 Nov 2018 11:26:52 [rsession-miros] ERROR system error 5 (Access is denied) [path=C:/Rhistory]; OCCURRED AT: rstudio::core::FilePath::open_w(rstudio_bo
45 07 Nov 2018 11:48:23 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
46 07 Nov 2018 20:23:30 [rsession-miros] ERROR system error 3 (The system cannot find the path specified) [path=D:/Desktop/! Školenie/D1-05-Vzorovy-Balicek/D1-05-Vzorovy-Balicek.j
47 07 Nov 2018 20:35:28 [rsession-miros] CLIENT EXCEPTION (rsession-miros): (TypeError) : null is not an object (evaluating 'a.type');|||com/google/gwt/dev/jjs/intrinsic/com/goog
48 07 Nov 2018 21:34:05 [rsession-miros] ERROR system error 2 (The system cannot find the file specified) [path=C:/Users/miros/AppData/Local/RStudio-Desktop/dictionaries/language:
49 07 Nov 2018 21:35:39 [rsession-miros] FOPEN system error 2 (The system cannot find the file specified) [path=C:/Users/miros/AppData/Local/RStudio-Desktop/dictionaries/language:
50 07 Nov 2018 21:35:41 [rsession-miros] FOPEN system error 2 (The system cannot find the file specified) [path=C:/Users/miros/AppData/Local/RStudio-Desktop/dictionaries/language:
51 07 Nov 2018 21:35:41 [rsession-miros] FOPEN system error 2 (The system cannot find the file specified) [path=C:/Users/miros/AppData/Local/RStudio-Desktop/dictionaries/language:
```

Stále mi to nejde -> Pošli mi log-file -> Diagnostický report

# Klávesové skratky

The screenshot shows the RStudio interface with the 'Keyboard Shortcut Quick Reference' window open. The window lists various keyboard shortcuts categorized by function: Tabs, Panes, Files, Execute, Source Navigation, Source Editor, Debug, Build, Console, Terminal, and Other. The 'Source Control' section is expanded, showing build-related commands like 'Ctrl+Shift+K' for 'Compile PDF'. The 'Environment' menu is also visible, showing options like 'Run', 'Import Dataset', and 'Global Environment'. A status bar at the bottom shows the current file path and line number.

Category	Shortcut	Description
Source Control	Ctrl+Alt+D	Diff Files
	Ctrl+Alt+M	Commit... Commit is empty
	Ctrl+Shift+K	Compile PDF
	Ctrl+Shift+P	Preview
	Ctrl+Shift+K	Knit Document
	Ctrl+Shift+B	Install and Restart
	Ctrl+Shift+L	Load All
	Ctrl+Shift+E	Check Package
	Ctrl+Shift+T	Test Package
	Ctrl+Shift+D	Document
Ctrl+Up	Move Lines Up Manually for the use of union and intersect in plot annotation.	
Ctrl+Down	Move Lines Down	
Ctrl+D	Delete Line	
Ctrl+L	Clear Console	
Ctrl+Up	Yank Line Up to Cursor	
Ctrl+Down	Yank Line After Cursor	
Ctrl+Y	Insert Yanked Text	
Alt+-	Insert Assignment Operator	
Ctrl+Shift+M	Insert Pipe Operator	
Ctrl+Shift+Alt+M	Rename in Scope	
Ctrl+Shift+Alt+R	Insert Roxygen Skeleton	
Shift+Tab	Insert Snippet: all possible	
Ctrl+Shift+S	Save Active File	
Ctrl+Shift+F9	Toggle Breakpoint	
F10	Execute Next Line	
F1	Show Function Help	
F2	Go To Function / File	

Help | Alt + Shift + K



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The R Journal

# Documentation

## Document Collections, Journals and Proceedings

In addition to the [manuals](#), [FAQs](#), the [R Journal](#) and its predecessor [R News](#), the following sites may be of interest to R users:

- Browsable HTML versions of the [manuals](#), [help pages](#) and [NEWS](#) for the developing versions of R “*R-patched*” and “*R-devel*”, updated daily.
- CRAN has a growing list of [contributed documentation](#) in a variety of languages.
- A list of [books](#) and other publications related to R.
- The [Journal of Statistical Software](#) features R-related articles like package guides on a regular basis.
- Proceedings from the International Workshops on [Distributed Statistical Computing](#).

## Smaller Collections and Single Documents

R guides and documentation not contained in the [contributed documentation](#) section of CRAN:

- Sigal Blay maintains a web page with “[Technical Notes on the R Programming Language](#)”.
- Wei-Chen Chen maintains a web page with notes on “[The Exploration of Statistic Software R](#)”.
- David Rossiter maintains a web page with several [\(geo-\)statistics tutorials using R](#).
- David Hiebeler maintains a tutorial “[Matlab/R Reference](#)” in PDF with some Matlab functions.
- K. A. Garrett et al have written several papers on “[Ecology and epidemiology in the R programming environment](#)” published as part of the [The Plant Health Instructor](#) (URL change on 2011-02-01).
- Benjamin Yakir has written a book named “[Introduction to Statistical Thinking \(With R, Without Calculus\)](#)”. Both the PDF document and data sets are available from the webpage.
- Avril Coghlan maintains
  - “[A Little Book of R for Biomedical Statistics](#)”
  - “[A Little Book of R for Time Series](#)”
  - “[A Little Book of R for Multivariate Analysis](#)”

which can be browsed as HTML and downloaded as PDF.

## Non-English Material

base (version 3.6.2)

# cbind: Combine R Objects by Rows or Columns

## Description

Take a sequence of vector, matrix or data-frame arguments and combine by *columns* or *rows*, respectively. These are generic functions with methods for other R classes.

## Usage

```
cbind(..., deparse.level = 1)
rbind(..., deparse.level = 1)
# S3 method for data.frame
rbind(..., deparse.level = 1, make.row.names = TRUE,
      stringsAsFactors = default.stringsAsFactors(), factor.exclude = NA)
```

## Arguments

... (generalized) vectors or matrices. These can be given as named arguments. Other R objects may be coerced as appropriate, or S4 methods may be used: see sections 'Details' and 'Value'. (For the `"*data.frame*"` method of `cbind` these can be further arguments to `*data.frame*` such as `stringsAsFactors`.)

**deparse.level** integer controlling the construction of labels in the case of non-matrix-like arguments (for the default method): `deparse.level = 0` constructs no labels; the default, `deparse.level = 1` or `2` constructs labels from the argument names, see the 'Value' section below.

# Generovanie dát

## Sekvencie

- `1:10`,
- `seq(10)`,
- `seq(1, 10, 2)`

## Replikácie/opakovanie

- `rep(1:4, 2)`,
- `rep(1:4, each = 2)`

## Permutácie a vzorové dáta

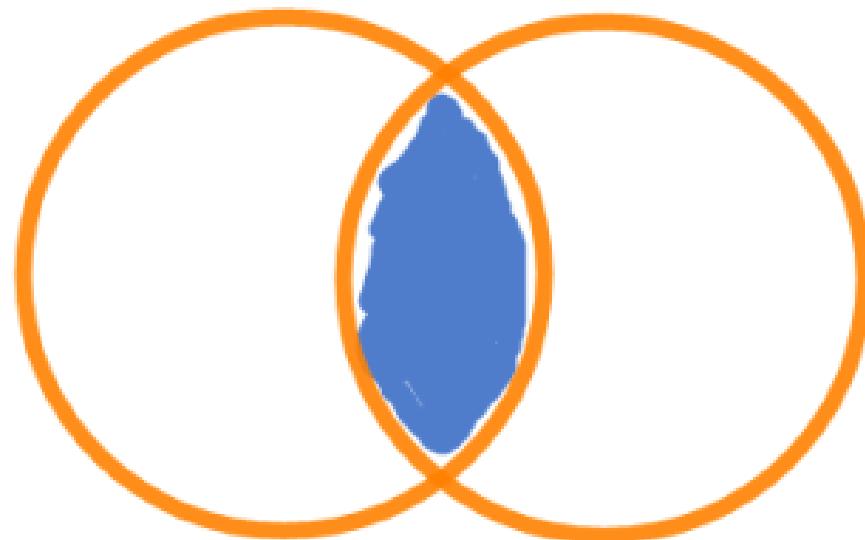
- `sample(1:20, 9)`

`as.Date("1998-12-17")`

# Matematické funkcie

Aritmetické funkcie	Goniometrické funkcie	Hyperbolické funkcie	Množinové operácie
<ul style="list-style-type: none"><li>• <code>log(x)</code></li><li>• <code>logb()</code></li><li>• <code>log10()</code></li><li>• <code>log2()</code></li><li>• <code>exp()</code></li><li>• <code>expm1()</code></li><li>• <code>log1p()</code></li><li>• <code>sqrt()</code></li></ul>	<ul style="list-style-type: none"><li>• <code>cos()</code></li><li>• <code>sin()</code></li><li>• <code>tan()</code></li><li>• <code>acos()</code></li><li>• <code>asin()</code></li><li>• <code>atan()</code></li><li>• <code>atan2()</code></li></ul>	<ul style="list-style-type: none"><li>• <code>cosh()</code></li><li>• <code>sinh()</code></li><li>• <code>tanh()</code></li><li>• <code>acosh()</code></li><li>• <code>asinh()</code></li><li>• <code>atanh()</code></li></ul>	<ul style="list-style-type: none"><li>• <code>union()</code></li><li>• <code>intersect()</code></li><li>• <code>setdiff()</code></li><li>• <code>setequal()</code></li></ul>

# Množinové operácie


$$A \cup B$$

$$A \cap B$$

Vennové diagramy

# Priemer, medián, modus

**MEAN GIRLS**

**MEDIAN GIRLS**

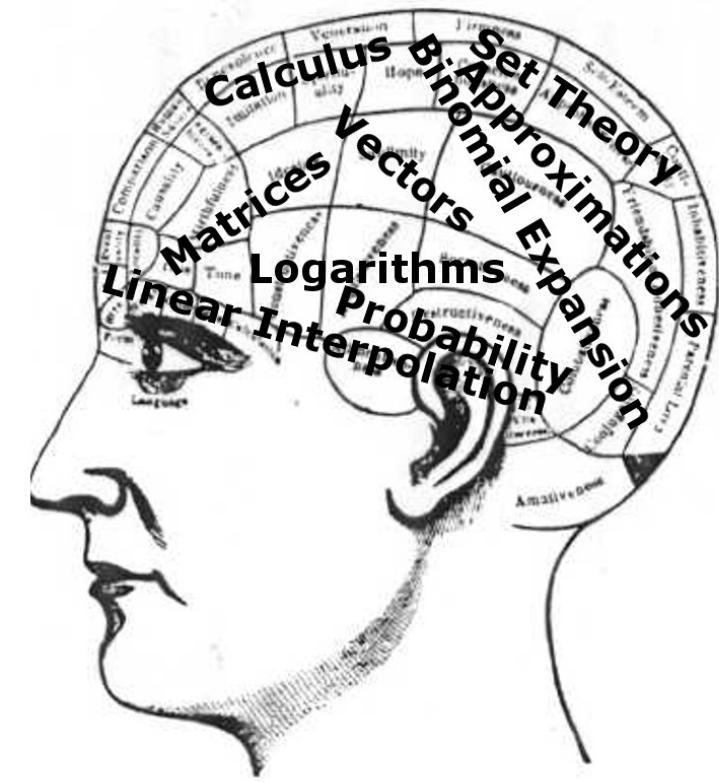
**MODE GIRLS**

$$\text{GIRLS}_{\text{mean}} = \frac{\sum_{i=1}^n \text{GIRLS}_i}{n}$$

$$B_m + I \cdot \left( \frac{\frac{n}{2} - (\sum \text{GIRLS}_i)_0}{\text{GIRLS}_m} \right)$$

$$I + h \left( \frac{\text{GIRLS}_m - \text{GIRLS}_2}{2 \text{GIRLS}_m - \text{GIRLS}_1 - \text{GIRLS}_2} \right)$$

"Sometimes I wonder what goes on in that head of yours..."



# Deskriptívna štatistika

```
# get means for variables in data frame mydata
```

```
# excluding missing values
```

```
sapply(mydata, mean, na.rm=TRUE)
```

```
sapply(USArrests, mean)
```

	Murder	Assault	UrbanPop	Rape
	7.788	170.760	65.540	21.232

```
# mean, median, 25th and 75th quartiles, min, max
```

```
summary(mydata)
```

```
# Tukey min, lower-hinge, median, upper-hinge, max
```

```
fivenum(x)
```



# Deskriptívna štatistika

Using the [Hmisc](#) package

```
library(Hmisc)
describe(mydata)
# n, nmiss, unique, mean, 5,10,25,50,75,90,95th percentiles
# 5 lowest and 5 highest scores
```

Using the [pastecs](#) package

```
library(pastecs)
stat.desc(mydata)
# nbr.val, nbr.null, nbr.na, min max, range, sum,
# median, mean, SE.mean, CI.mean, var, std.dev, coef.var
```



# Deskriptívna štatistika

```
> describe(USArrests)
```

USArrests

4 Variables 50 Observations

---

Murder

n	missing	distinct	Info	Mean	Gmd	.05	.10	.25	.50	.75
50	0	43	1	7.788	5.022	2.145	2.560	4.075	7.250	11.250
.90	.95									
13.320	15.400									

lowest : 0.8 2.1 2.2 2.6 2.7, highest: 13.2 14.4 15.4 16.1 17.4

---

Assault

n	missing	distinct	Info	Mean	Gmd	.05	.10	.25	.50	.75
50	0	45	1	170.8	96.44	50.25	56.90	109.00	159.00	249.00
.90	.95									
279.60	297.30									

lowest : 45 46 48 53 56, highest: 285 294 300 335 337



# Frekvenčné a krížové tabuľky

```
# 2-Way Frequency Table  
attach(mydata)  
mytable <- table(A,B) # A will be rows, B will be columns  
mytable # print table  
  
margin.table(mytable, 1) # A frequencies (summed over B)  
margin.table(mytable, 2) # B frequencies (summed over A)  
  
prop.table(mytable) # cell percentages  
prop.table(mytable, 1) # row percentages  
prop.table(mytable, 2) # column percentages
```

```
# 3-Way Frequency Table  
mytable <- table(A, B, C)  
ftable(mytable)
```



# Frekvenčné a krížové tabuľky

```
# 3-Way Frequency Table  
mytable <- table(A, B, C)  
ftable(mytable)
```

```
# 3-Way Frequency Table  
mytable <- xtabs(~A+B+c, data=mydata)  
ftable(mytable) # print table  
summary(mytable) # chi-square test of indepedence
```



# Frekvenčné a krížové tabuľky

```
# 2-Way Cross Tabulation  
library(gmodels)  
CrossTable(mydata$myrowvar, mydata$mycolvar)
```



# Testy nezávislosti

## Test Chi-Square

- Pre dvojcestné tabuľky môžete použiť test chisq.test (mytable) na overenie nezávislosti premennej riadka a stĺpca.
- Predvolene je hodnota p vypočítaná z asymptotickej distribúcie štatistických údajov testu.
- Prípadne môže byť hodnota p odvodená pomocou simultánnej funkcie Monte Carlo.

## Fisher Exact Test

- fisher.test (x) poskytuje presný test nezávislosti. x je dvojrozmerná kontingenčná tabuľka v maticovej forme.

```
> chisq.test(zlocinci)
```

Pearson's chi-squared test

```
data: zlocinci  
X-squared = 714.85, df = 147, p-value < 2.2e-16
```

```
Warning message:  
In chisq.test(zlocinci) : chi-squared approximation may be incorrect  
> |
```

# Korelácia

Option	Description
<b>x</b>	Matrix or data frame
<b>use</b>	Specifies the handling of missing data. Options are <b>all.obs</b> (assumes no missing data - missing data will produce an error), <b>complete.obs</b> (listwise deletion), and <b>pairwise.complete.obs</b> (pairwise deletion)
<b>method</b>	Specifies the type of correlation. Options are <b>pearson</b> , <b>spearman</b> or <b>kendall</b> .

```
# Correlations/covariances among numeric variables in  
# data frame mtcars. Use listwise deletion of missing data.  
cor(mtcars, use="complete.obs", method="kendall")  
cov(mtcars, use="complete.obs")
```



# Korelácia

```
# Correlations with significance levels  
library(Hmisc)  
rcorr(x, type="pearson") # type can be pearson or spearman  
  
#mtcars is a data frame  
rcorr(as.matrix(mtcars))
```

```
# Correlation matrix from mtcars  
# with mpg, cyl, and disp as rows  
# and hp, drat, and wt as columns  
x <- mtcars[1:3]  
y <- mtcars[4:6]  
cor(x, y)
```



# t-test

```
# independent 2-group t-test  
t.test(y~x) # where y is numeric and x is a binary factor
```

```
# independent 2-group t-test  
t.test(y1,y2) # where y1 and y2 are numeric
```

```
# paired t-test  
t.test(y1,y2,paired=TRUE) # where y1 & y2 are numeric
```

```
# one sample t-test  
t.test(y, mu=3) # H0: μ=3
```

# Neparametrické testy skupín

```
# independent 2-group t-test  
t.test(y~x) # where y is numeric and x is a binary factor
```

```
# independent 2-group t-test  
t.test(y1,y2) # where y1 and y2 are numeric
```

```
# paired t-test  
t.test(y1,y2,paired=TRUE) # where y1 & y2 are numeric
```

```
# one sample t-test  
t.test(y, mu=3) # H0: μ=3
```

**alternative="less" or alternative="greater"**

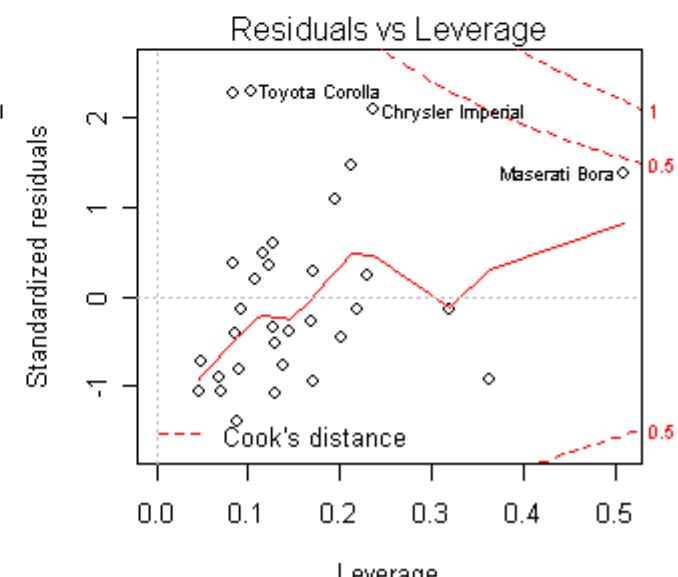
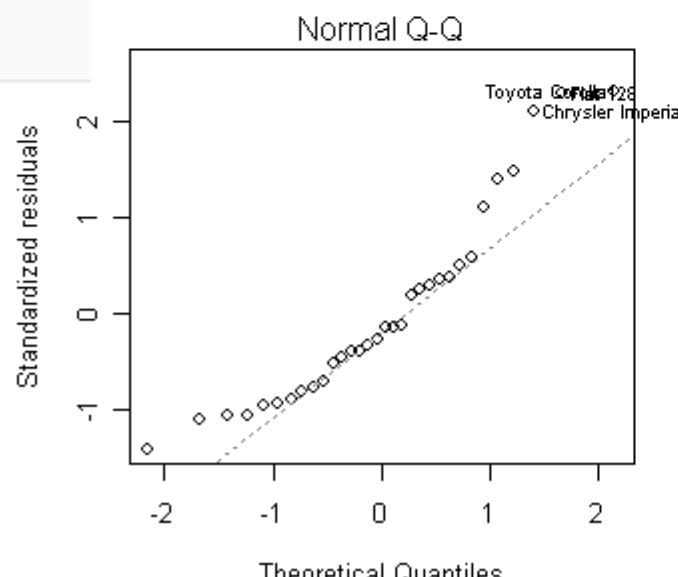
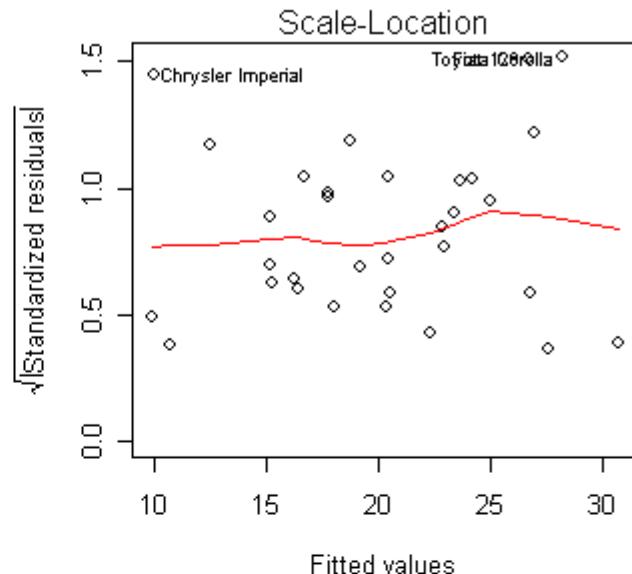
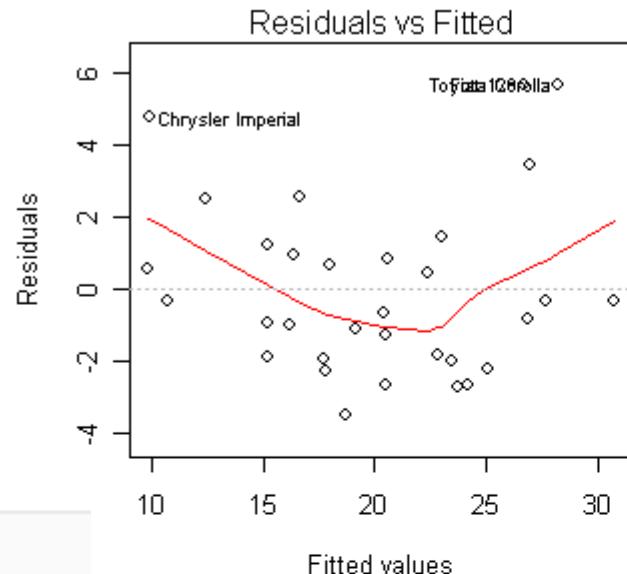
# Viacnásobná (lineárna) regresia

```
# Multiple Linear Regression Example  
fit <- lm(y ~ x1 + x2 + x3, data=mydata)  
summary(fit) # show results
```

```
# Other useful functions  
coefficients(fit) # model coefficients  
confint(fit, level=0.95) # CIs for model parameters  
fitted(fit) # predicted values  
residuals(fit) # residuals  
anova(fit) # anova table  
vcov(fit) # covariance matrix for model parameters  
influence(fit) # regression diagnostics
```

# Diagnostické grafy

```
# diagnostic plots  
layout(matrix(c(1,2,3,4),2,2)) # optional 4 graphs/page  
plot(fit)
```



# Porovnanie a validácia modelov

```
# compare models  
fit1 <- lm(y ~ x1 + x2 + x3 + x4, data=mydata)  
fit2 <- lm(y ~ x1 + x2)  
anova(fit1, fit2)
```

```
# K-fold cross-validation  
library(DAAG)  
cv.lm(df=mydata, fit, m=3) # 3 fold cross-validation
```



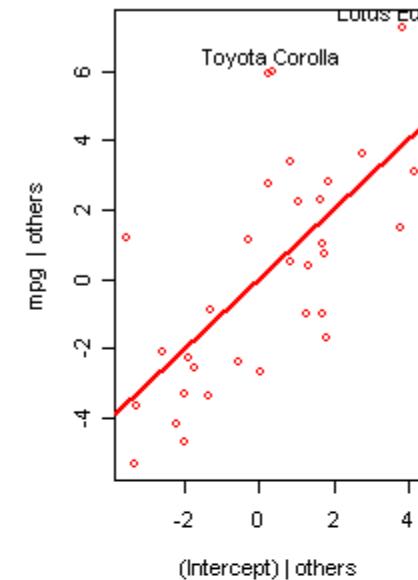
# Regresná diagnostika

```
# Assume that we are fitting a multiple linear regression  
# on the MTCARS data  
library(car)  
fit <- lm(mpg~disp+hp+wt+drat, data=mtcars)
```

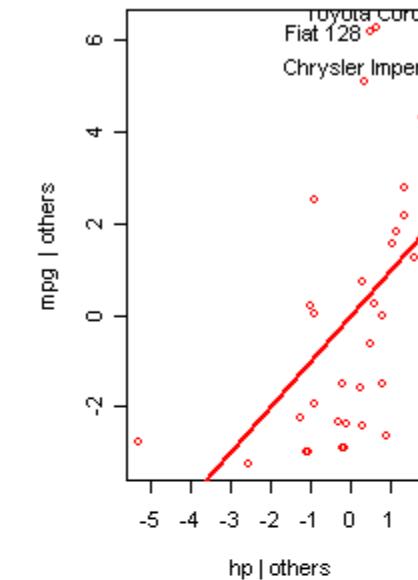
# Regresná diagnostika

```
# Assessing Outliers  
outlierTest(fit) # Bonferonni p-value for most extreme obs  
qqPlot(fit, main="QQ Plot") #qq plot for studentized resid  
leveragePlots(fit) # leverage plots
```

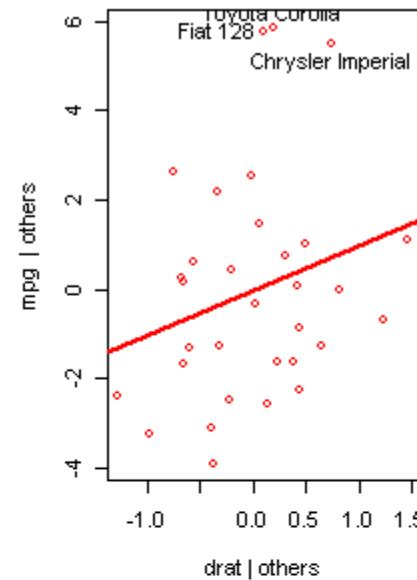
Leverage Plot



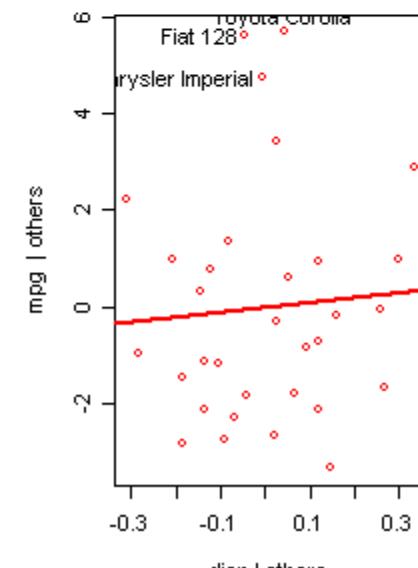
Leverage Plot



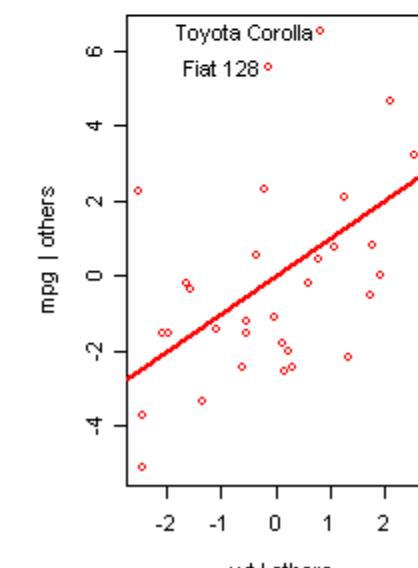
Leverage Plot



Leverage Plot

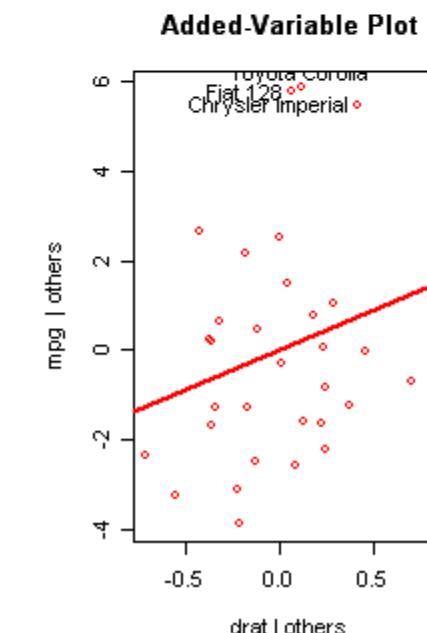
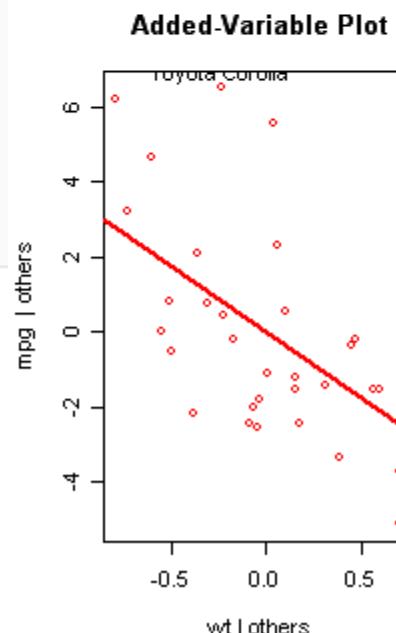
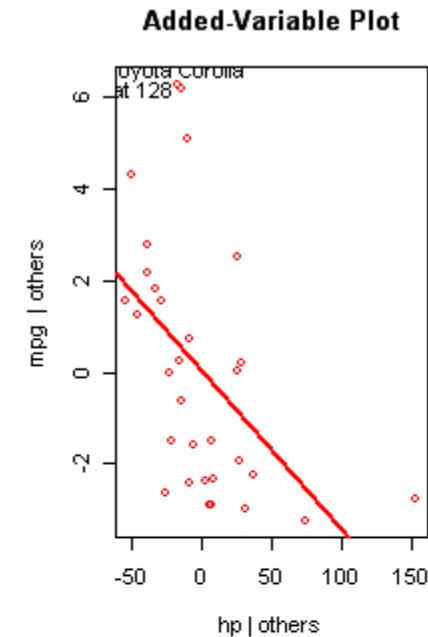
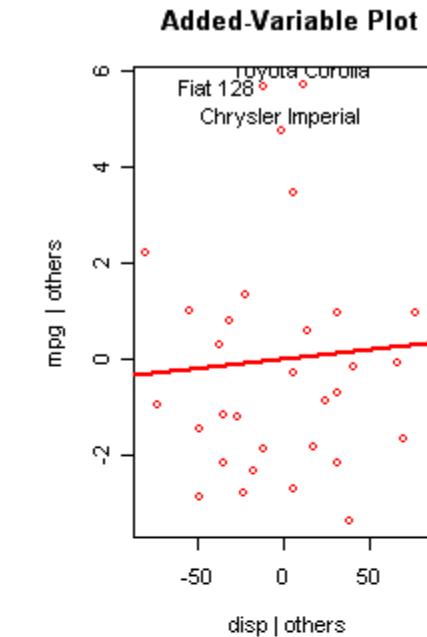
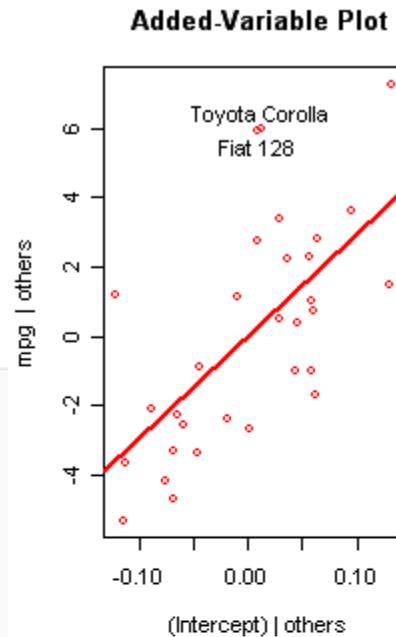


Leverage Plot

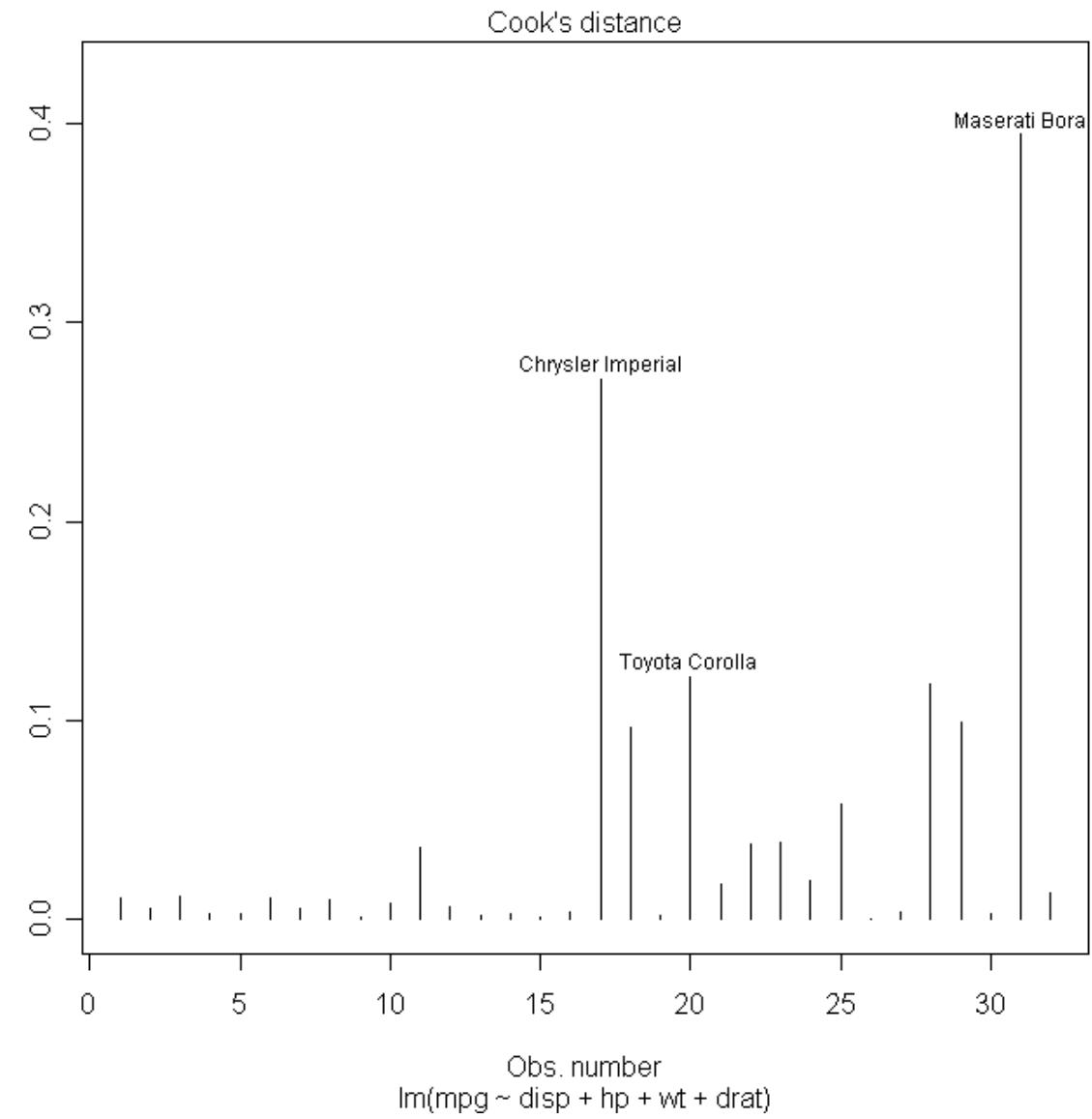
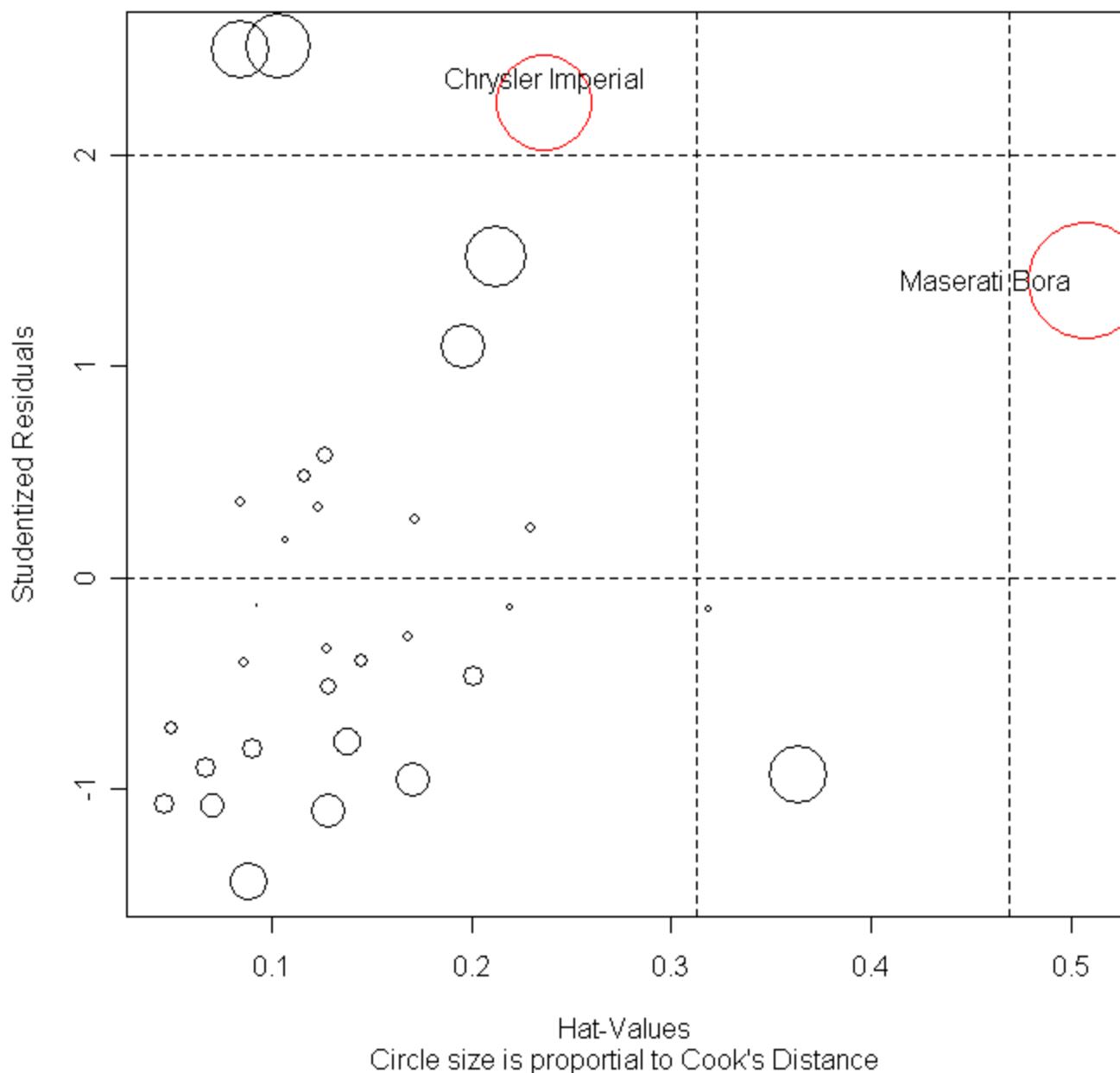


# Vplyvné pozorovania

```
# Influential Observations  
# added variable plots  
av.Plots(fit)  
# Cook's D plot  
# identify D values > 4/(n-k-1)  
cutoff <- 4/((nrow(mtcars)-length(fit$coefficients)-2))  
plot(fit, which=4, cook.levels=cutoff)  
# Influence Plot  
influencePlot(fit, id.method="identify", main="Influence Plot",  
sub="Circle size is proportional to Cook's Distance" )
```



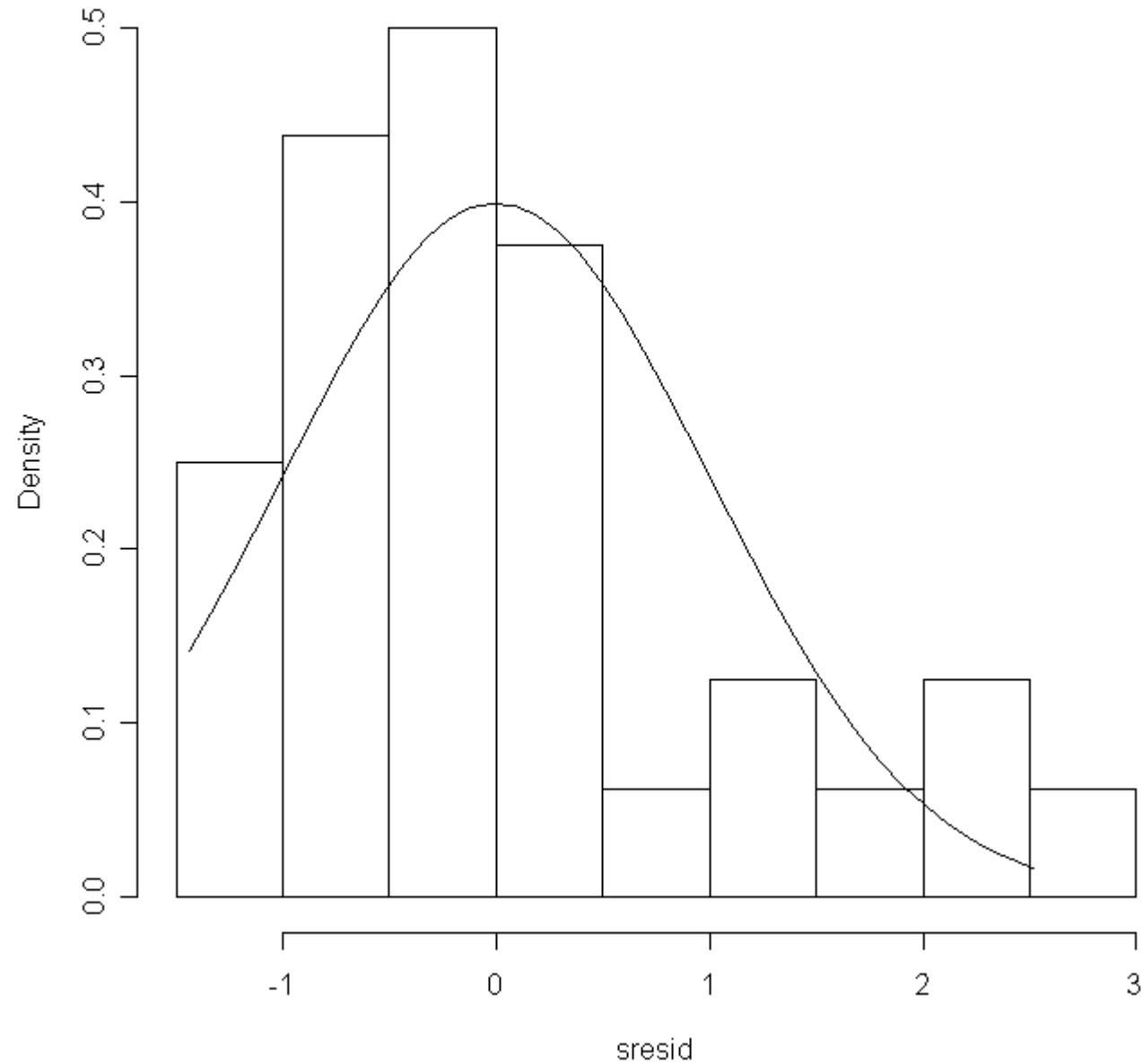
## Influence Plot



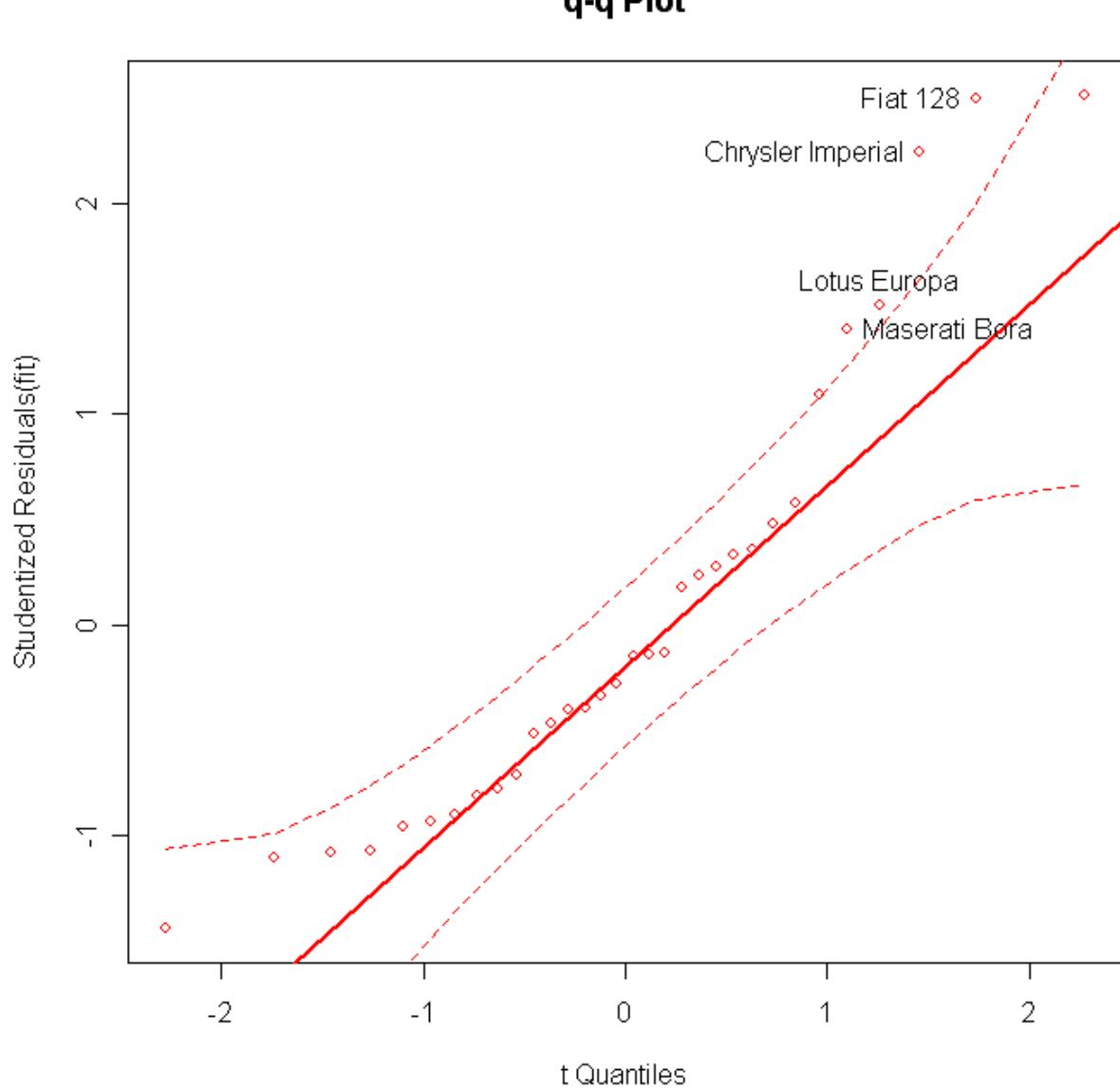
# Non-normality

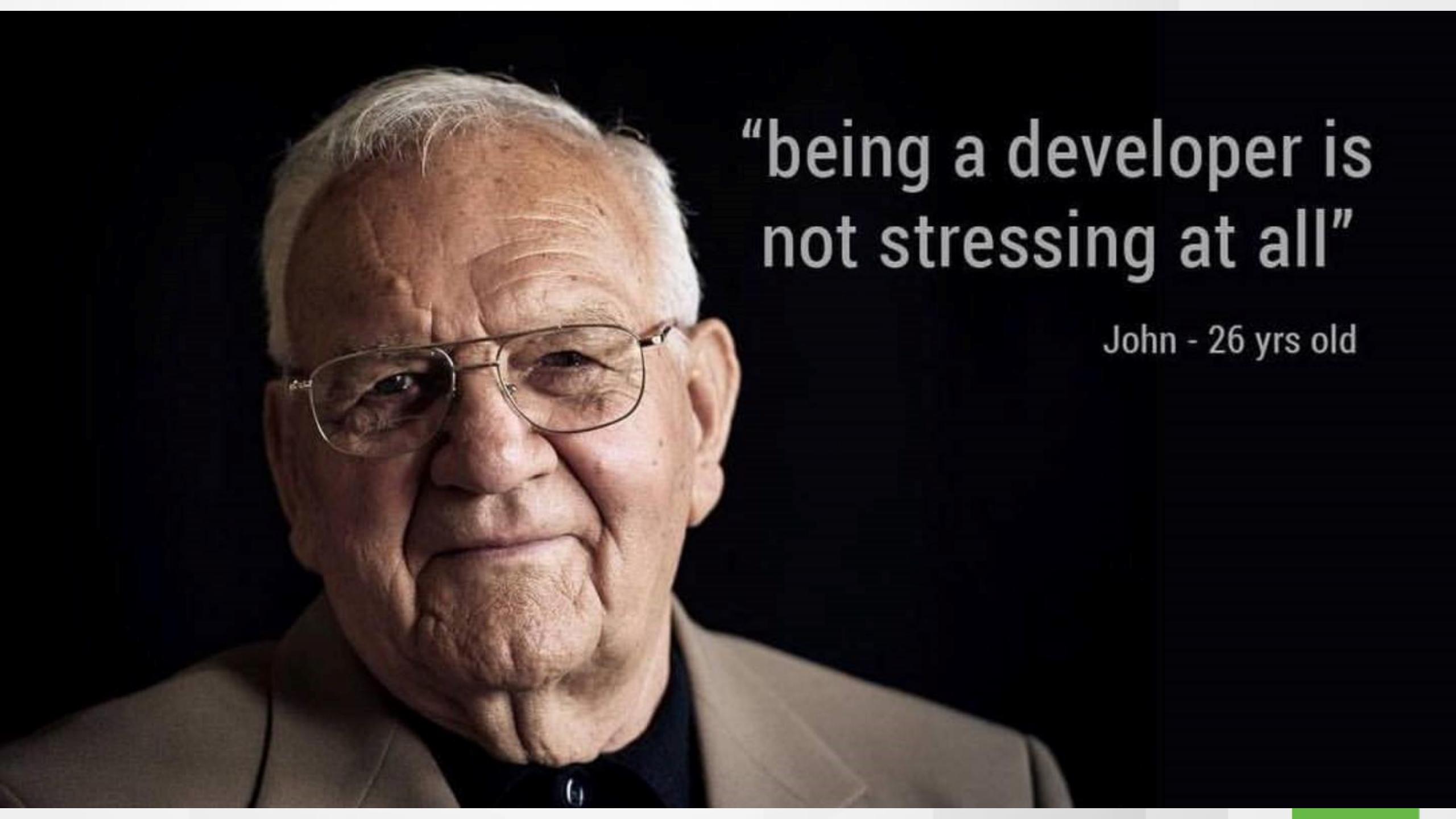
```
# Normality of Residuals  
# qq plot for studentized resid  
qqPlot(fit, main="QQ Plot")  
# distribution of studentized residuals  
library(MASS)  
sresid <- studres(fit)  
hist(sresid, freq=FALSE,  
     main="Distribution of Studentized Residuals")  
xfit<-seq(min(sresid),max(sresid),length=40)  
yfit<-dnorm(xfit)  
lines(xfit, yfit)
```

## Distribution of Studentized Residuals



q-q Plot



A close-up portrait of an elderly man with white hair and glasses, wearing a suit. He is looking slightly to the left of the camera with a neutral expression.

“being a developer is  
not stressing at all”

John - 26 yrs old

# Chyby naše každodenné...

Dokument chýba (je možné, že bol odstránený, prípadne nemáte prístup na čítanie) (riadok 10, súbor main) [Ignorovať](#)

Chýba znak ; pred príkazom. (riadok 2, súbor main) [Ignorovať](#)

TypeError: (class)@4adbe63e nie je funkcia, je to object. (riadok 49, súbor Kód) [Ignorovať](#)

Exceeded maximum stack depth (riadok 25, súbor main) [Ignorovať](#)

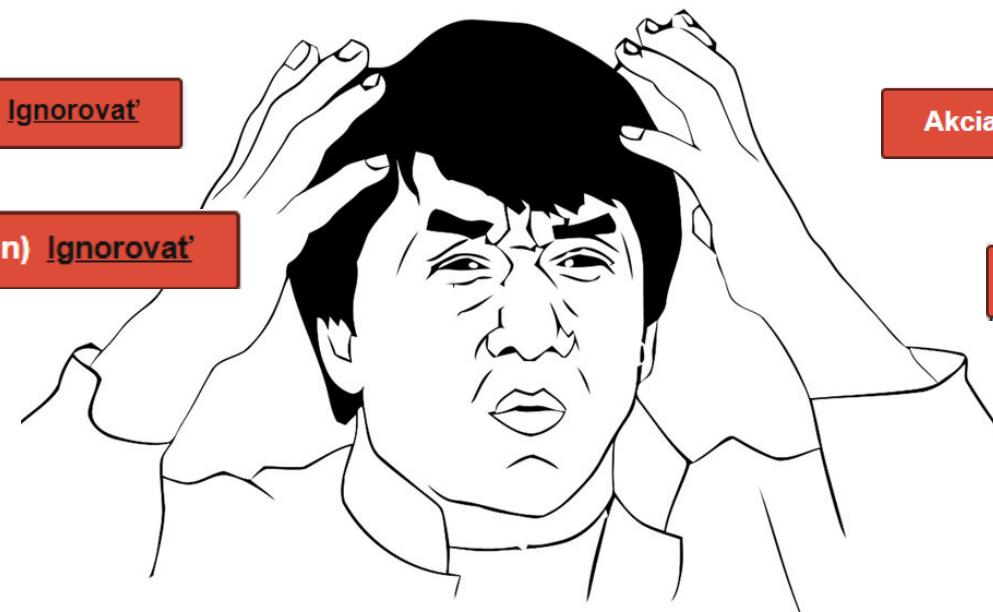
TypeError: Nie je možné volať metódu „getId“ funkcie null. (riadok 4, súbor main) [Ignorovať](#)

Chýba znak ; pred príkazom. (riadok 21, súbor Kód) [Ignorovať](#)

Akcia nie je povolená (riadok 10, súbor main) [Ignorovať](#)

Neplatná hodnota farby. (riadok 119, súbor main) [Ignorovať](#)

Syntaktická chyba. (riadok 6, súbor main) [Ignorovať](#)



# Bodkočiarka/semicolon

## WHO WOULD WIN?

a bunch of code

one misplaced  
semicolon

;

```
private void main() {
    String query = "SELECT * FROM table WHERE id = 1";
    Statement statement = connection.createStatement();
    ResultSet resultSet = statement.executeQuery(query);
    while (resultSet.next()) {
        System.out.println(resultSet.getString("name"));
    }
}

public void test() {
    String query = "SELECT * FROM table WHERE id = 1";
    Statement statement = connection.createStatement();
    ResultSet resultSet = statement.executeQuery(query);
    while (resultSet.next()) {
        System.out.println(resultSet.getString("name"));
    }
}

public void test2() {
    String query = "SELECT * FROM table WHERE id = 1";
    Statement statement = connection.createStatement();
    ResultSet resultSet = statement.executeQuery(query);
    while (resultSet.next()) {
        System.out.println(resultSet.getString("name"));
    }
}

public void test3() {
    String query = "SELECT * FROM table WHERE id = 1";
    Statement statement = connection.createStatement();
    ResultSet resultSet = statement.executeQuery(query);
    while (resultSet.next()) {
        System.out.println(resultSet.getString("name"));
    }
}
```

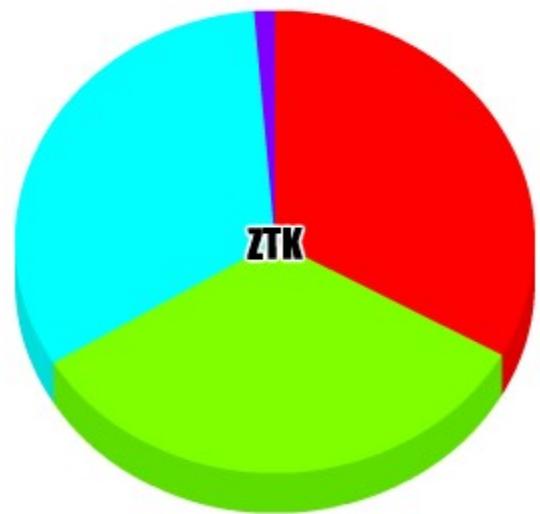
Who would win?



IT ACADEMY

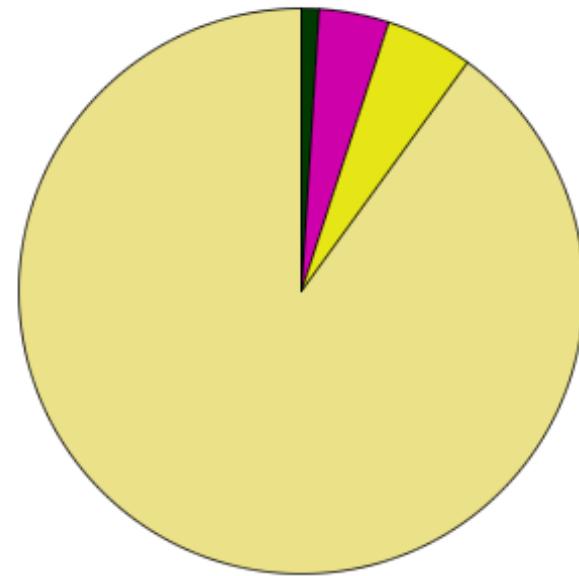
# Bodkočiarka/semicolon

## Why my program won't compile



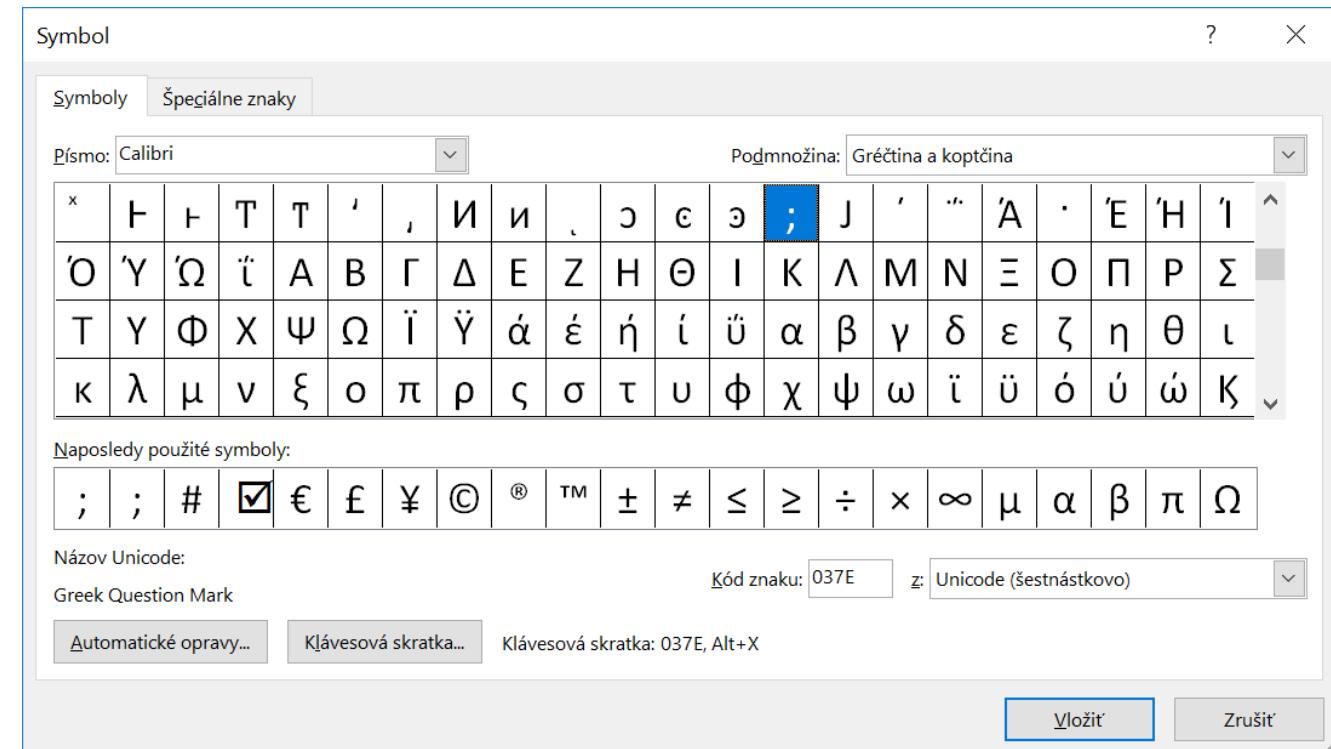
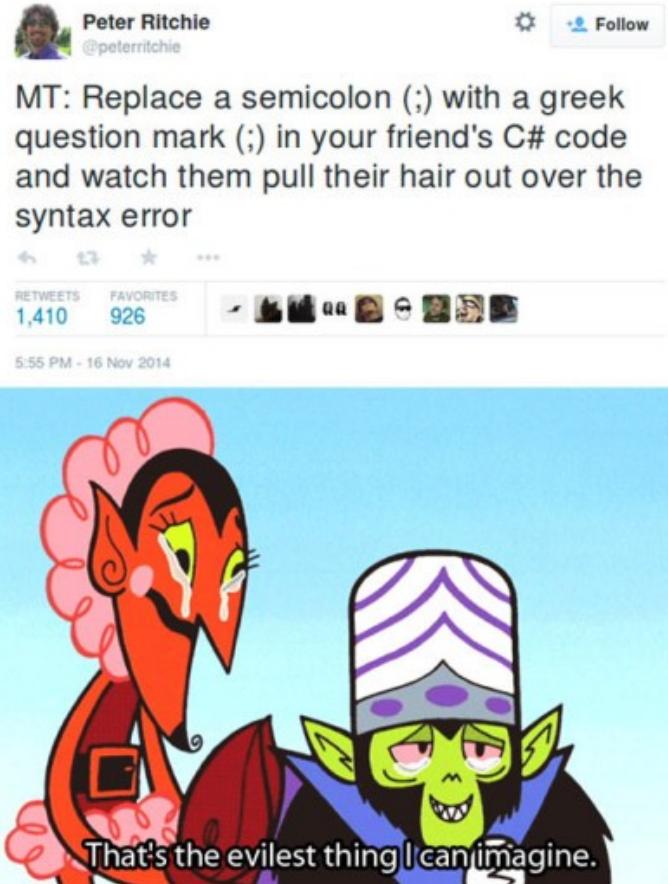
- The Compiler Sucks.
- The Programming language sucks.
- Semicolons ";".
- My code sucks.

Reasons to use a semicolon



- 1% Belongs in a sentence
- 4% Shouldn't be in sentence
- 5% winky face
- 90% programming

# Pozor na Greek Question Mark



# Welcome to Kaggle Datasets

The best place to discover and seamlessly analyze open data



## Discover

Use the search box to find open datasets on everything from government, health, and science to popular games and dating trends.



## Explore

Execute, share, and comment on code for any open dataset with our in-browser analytics tool, [Kaggle Kernels](#). You can also download datasets in an easy-to-read format.



## Create a Dataset

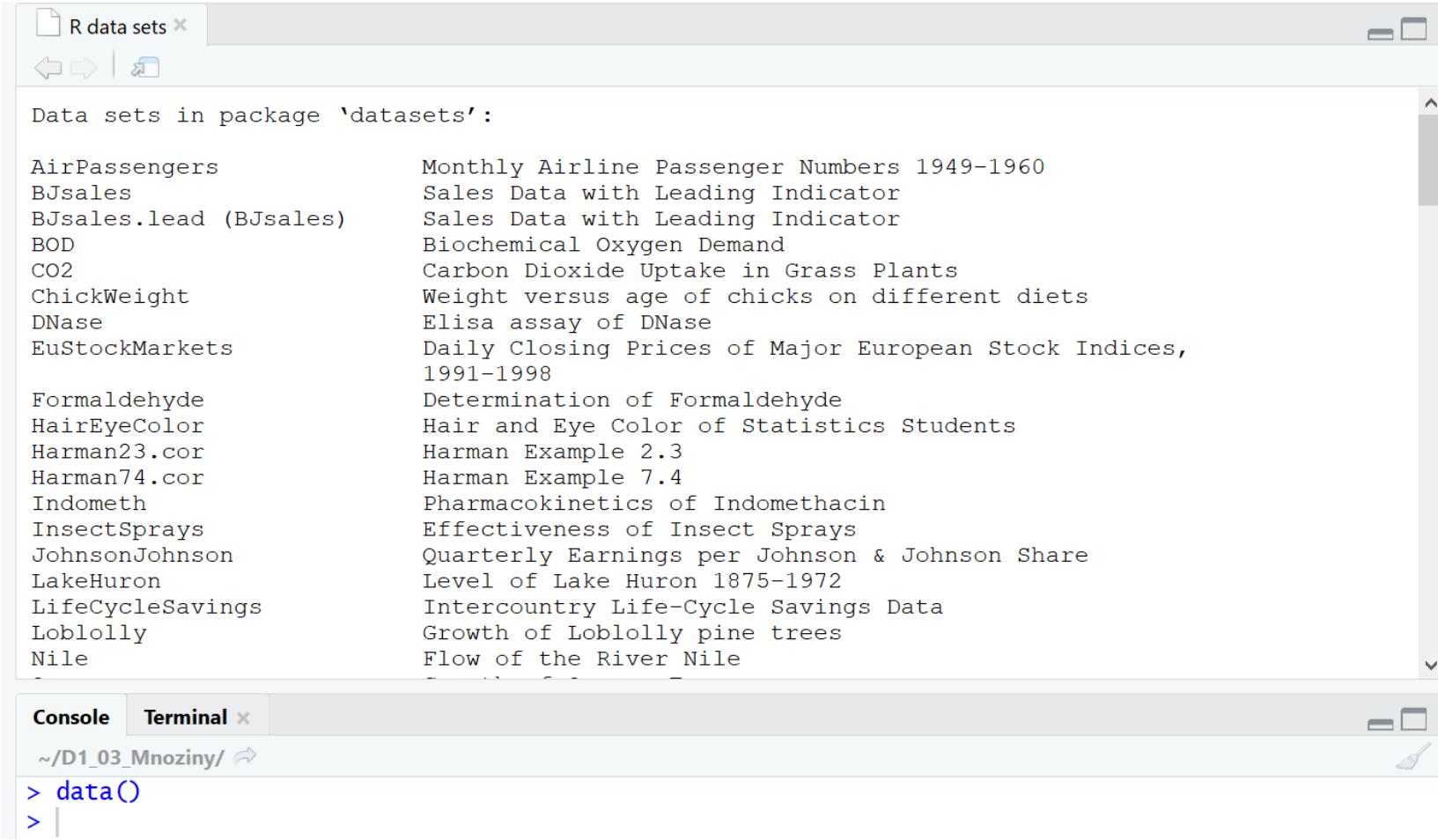
Contribute to the open data movement and connect with other data enthusiasts by clicking "[New Dataset](#)" to publish an open dataset of your own.

[Learn More](#)[New Dataset](#)[Dismiss](#)

Join Kaggle's inaugural \$30,000 Data Science for Good challenge with Kiva.  
Click to learn more and participate.



# Zabudované datasety



The screenshot shows the RStudio interface. The top panel is the 'R data sets' browser, displaying a list of datasets from the 'datasets' package. The bottom panel is the 'Console' tab, showing the command `> data()` entered by the user.

Data sets in package 'datasets':

AirPassengers	Monthly Airline Passenger Numbers 1949-1960
BJSales	Sales Data with Leading Indicator
BJSales.lead (BJSales)	Sales Data with Leading Indicator
BOD	Biochemical Oxygen Demand
CO2	Carbon Dioxide Uptake in Grass Plants
ChickWeight	Weight versus age of chicks on different diets
DNase	Elisa assay of DNase
EuStockMarkets	Daily Closing Prices of Major European Stock Indices, 1991-1998
Formaldehyde	Determination of Formaldehyde
HairEyeColor	Hair and Eye Color of Statistics Students
Harman23.cor	Harman Example 2.3
Harman74.cor	Harman Example 7.4
Indometh	Pharmacokinetics of Indomethacin
InsectSprays	Effectiveness of Insect Sprays
JohnsonJohnson	Quarterly Earnings per Johnson & Johnson Share
LakeHuron	Level of Lake Huron 1875-1972
LifeCycleSavings	Intercountry Life-Cycle Savings Data
Loblolly	Growth of Loblolly pine trees
Nile	Flow of the River Nile

Console Terminal x

~/D1\_03\_Mnoziny/ ↵

> data()  
> |

Data()

# Apropos a demo

- Príkaz **apropos ("nazov")** zobrazíme príbuzné príkazy k príkazu názov, pre príklady k nejakej téme použijeme príkaz example (tema).
- K dispozícii sú tiež PDF manuály, ktoré obsahujú základné manuály a referencie o funkciách.
- Funkcia **demo** je používateľsky priaznivé prostredie, v ktorom bežia **demonštrácie (vzorové programy)** R **skriptov**.
- Príkaz **demo()** vypíše zoznam všetkých dostupných demonštrácií.

Next

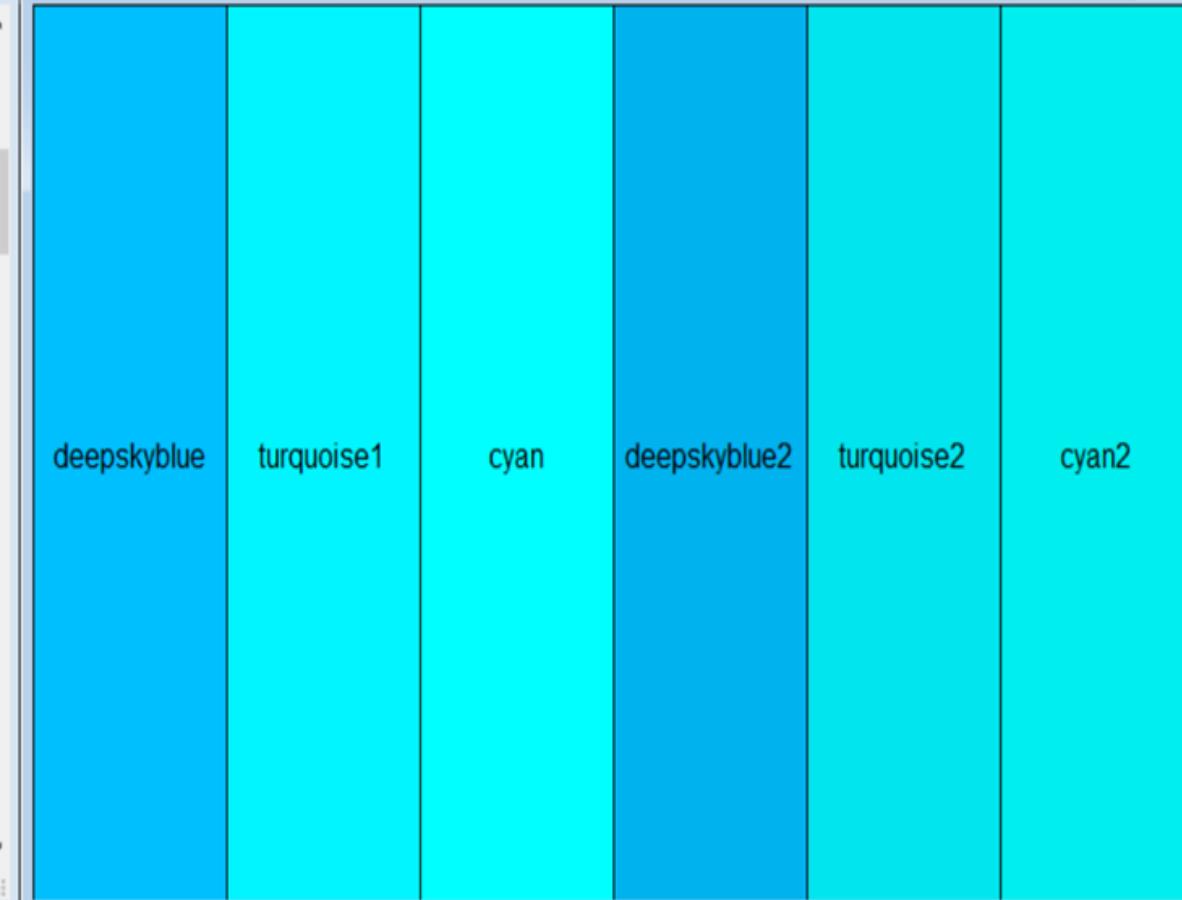


## R Console

```
> apropos("lq")
[1] "evalq"      "evalqOnLoad"
> apropos("ls")
[1] ".colSums"    ".getXlevels"      ".signalSimpleWarning"
[4] "ar.ols"       "co.intervals"     "colSums"
[7] "de.ncols"     "densCols"        "droplevels"
[10] "droplevels.data.frame" "droplevels.factor" "evalSource"
[13] "formals"      "formals<-"      "getAllSuperClasses"
[16] "getLoadedDLLs" "ifelse"          "labels"
[19] "labels.default" "levels"          "levels.default"
[22] "levels<-"     "levels<-factor" "limitedLabels"
[25] "ls"            "ls.diag"         "ls.print"
[28] "ls.str"        "lsf.str"         "lsfit"
[31] "nlevels"       "nls"              "nls.control"
[34] "NLSstAsymptotic" "NLSstClosestX" "NLSstLfAsymptote"
[37] "NLSstRtAsymptote" "occupationalStatus" "OlsonNames"
[40] "residuals"     "residuals.glm"   "residuals.lm"
[43] "restartFormals" "symbols"        "sys.calls"
[46] "weighted.residuals"
> demo()
> demo(colors)
```

```
demo(colors)
---- ~~~~~~
```

## R Click or hit ENTER for next page



Use 'demo(package = .packages(all.available = TRUE))'

### LEARN



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🕒 4 Hours ⚡ 6200 XP

[Keep Making Progress](#)

### PRACTICE



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### APPLY



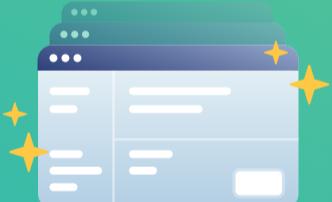
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0 / 250 XP Gained | 0 Day streak | 22 Hours Left



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NEW COURSE



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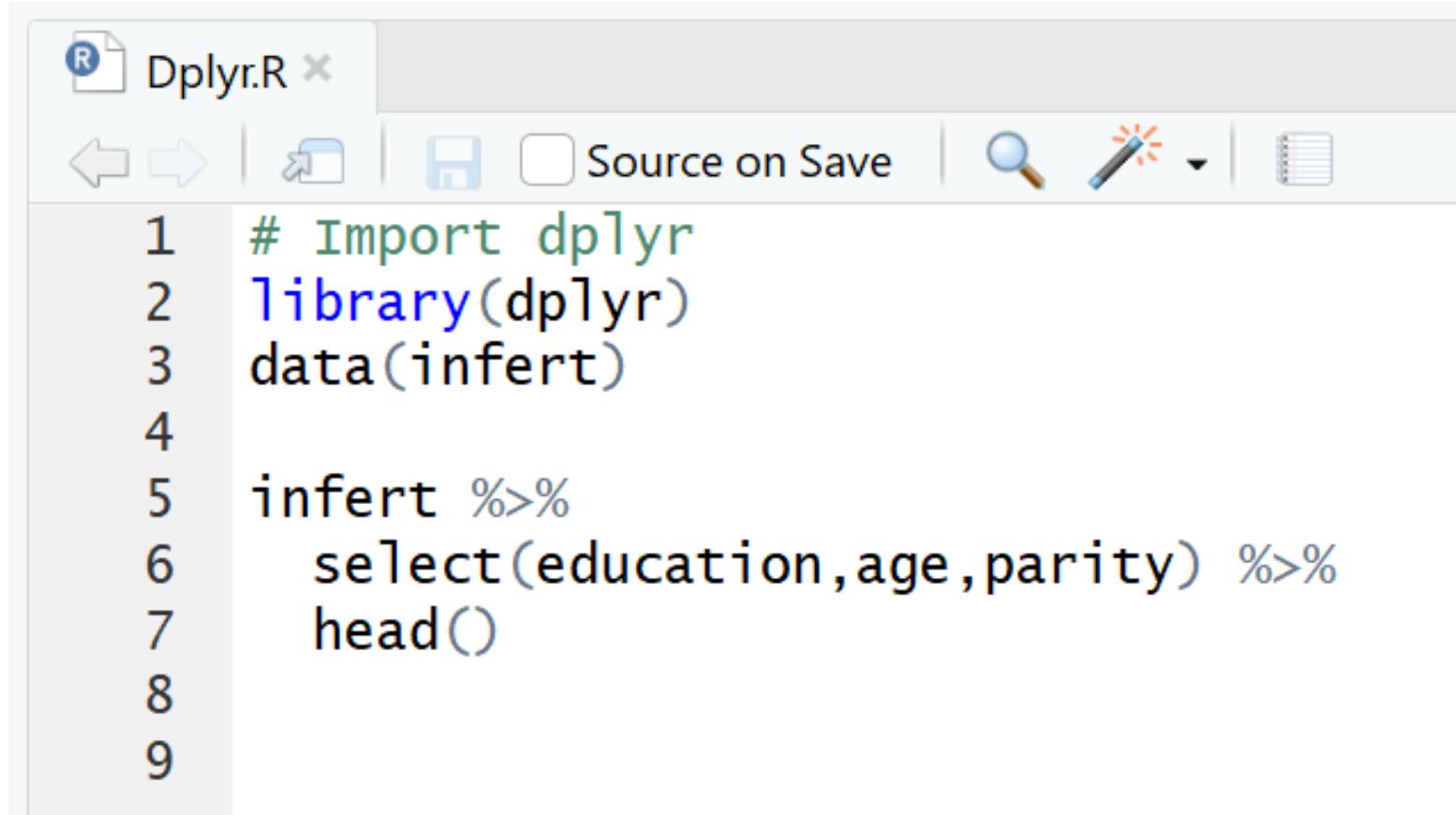


NEW COURSE



Did you know  
DataCamp offers

# Výber dát



```
# Import dplyr
library(dplyr)
data(infert)

infert %>%
  select(education,age,parity) %>%
  head()
```

# Zlúčenie/merging údajov

```
# merge two data frames by ID  
total <- merge(data frameA,data frameB,by="ID")
```

```
# merge two data frames by ID and Country  
total <- merge(data frameA,data frameB,by=c("ID", "Country"))
```

```
total <- rbind(data frameA, data frameB)
```



## Selecting Columns of Data

When you're dealing with large datasets, it can be confusing to look at many different columns of data at once. Here, select the `President`, `Date`, and `Approve` columns from the `approval_polls` dataset, and pipe the result to the `head()` function to display the results.

### INSTRUCTIONS 100 XP

- Using the `select()` function from the `tidyverse` package, extract the `President`, `Date`, and `Approve` columns from the `approval_polls` dataset.

Take Hint (-30 XP)

### Course Outline

#### SCRIPT.R

```
1 # Import dplyr
2 library(dplyr)
3
4 # Select President, Date, and Approve from approval_polls
5 approval_polls %>%
6   select(President, Date, Approve) %>%
7   head()
```



Run Code

Submit Answer

#### R CONSOLE

```
> # Import dplyr
> library(dplyr)
>
> # Select President, Date, and Approve from approval_polls
> approval_polls %>%
  select(President, Date, Approve) %>%
  head()
  President      Date Approve
1    Trump 12/12/2017      36
2    Trump 12/9/2017       36
3    Trump 12/6/2017       37
4    Trump 12/3/2017       35
5    Trump 11/30/2017      34
6    Trump 11/27/2017      37
```

# Štruktúra IF a funkcia ifelse

ifelse

```
ifelse(test, yes, no)
```

if-else

```
if (cond) expr
if (cond) expr1 else expr2
```



# Štruktúra SWITCH

switch

```
switch( expr, ... )
```



IT ACADEMY

# Cykly a štruktúra for, while

for

```
for (var in seq) expr
```

while

```
while (cond) expr
```



# Príklad

```
# transpose of a matrix
# a poor alternative to built-in t() function

mytrans <- function(x) {
  if (!is.matrix(x)) {
    warning("argument is not a matrix: returning NA")
    return(NA_real_)
  }
  y <- matrix(1, nrow=ncol(x), ncol=nrow(x))
  for (i in 1:nrow(x)) {
    for (j in 1:ncol(x)) {
      y[j,i] <- x[i,j]
    }
  }
  return(y)
}

# try it
z <- matrix(1:10, nrow=5, ncol=2)
tz <- mytrans(z)
```



# Vlastné funkcie

```
myfunction <- function(arg1, arg2, ...){  
  statements  
  return(object)  
}
```



# Vlastné funkcie

```
# function example - get measures of central tendency
# and spread for a numeric vector x. The user has a
# choice of measures and whether the results are printed.

mysummary <- function(x,npar=TRUE,print=TRUE) {
  if (!npar) {
    center <- mean(x); spread <- sd(x)
  } else {
    center <- median(x); spread <- mad(x)
  }
  if (print & !npar) {
    cat("Mean=", center, "\n", "SD=", spread, "\n")
  } else if (print & npar) {
    cat("Median=", center, "\n", "MAD=", spread, "\n")
  }
  result <- list(center=center,spread=spread)
  return(result)
}

# invoking the function
set.seed(1234)
x <- rpois(500, 4)
y <- mysummary(x)
Median= 4
MAD= 1.4826
# y$center is the median (4)
# y$spread is the median absolute deviation (1.4826)

y <- mysummary(x, npar=FALSE, print=FALSE)
# no output
# y$center is the mean (4.052)
# y$spread is the standard deviation (2.01927)
```

t()

# Čo sa oplatí prečítať?

## Slovensko a česko

- Albatrosmedia
- Kopp
- Grada
- Wolters Kluwer
- BEN
- Veda

## Zahraničie

- O'Reilly
- Manning
- Packt
- Apress
- Wiley
- No Starch Press

## YouTube tutoriály

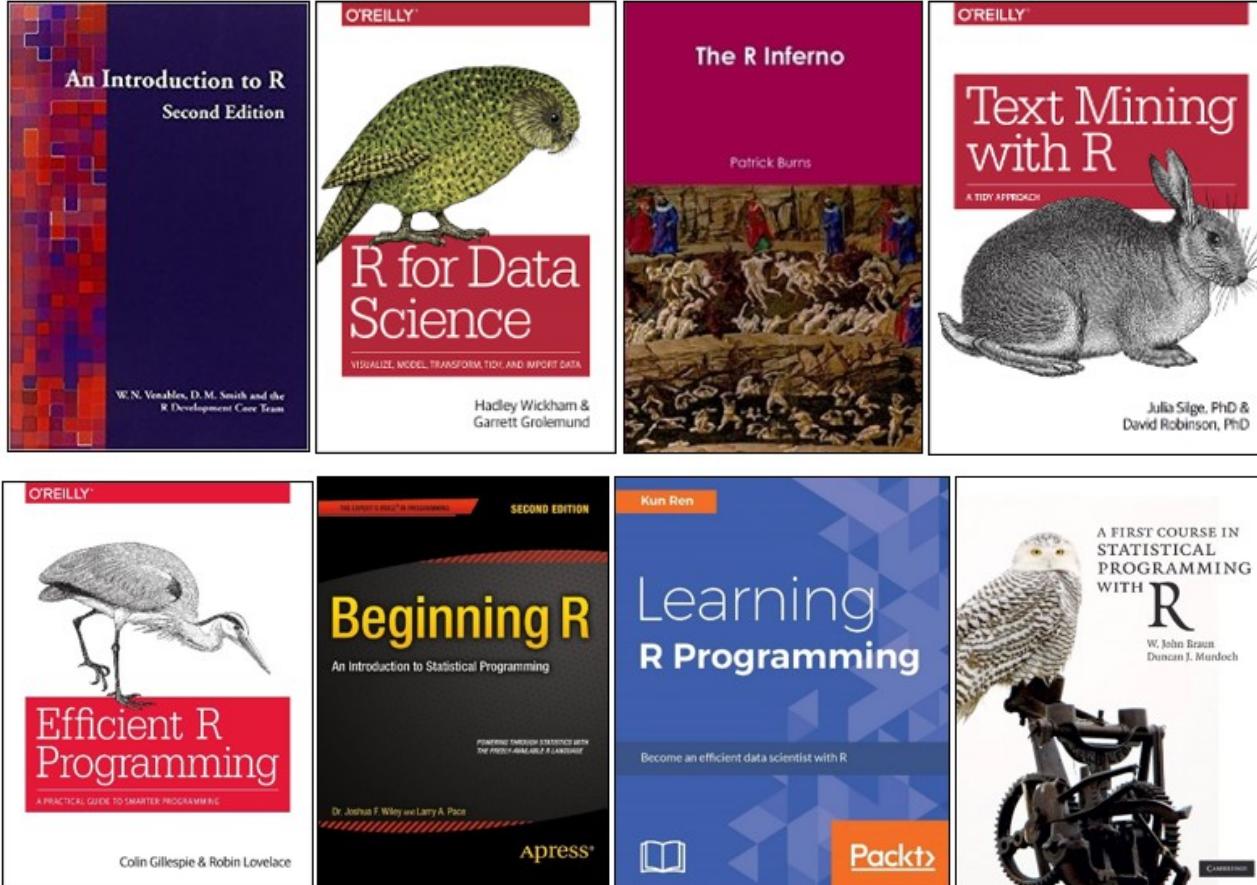
- [IT Academy](#)

# Čo sa oplatí/neoplatí prečítať SK/CZ



Na R nič...

# Čo sa oplatí/neoplatí prečítať EN



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Q&amp;A for work

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# Tags

A tag is a keyword or label that categorizes your question with other, similar questions. Using the right tags makes it easier for others to find and answer your question.

[google apps](#)[Popular](#) [Name](#) [New](#)[!\[\]\(c1c6c3489c2720c172908ee365bf0d21\_img.jpg\) google-apps-script](#) × 21262

Use for questions about Google Apps Script, Google's JavaScript-based cloud scripting language for automating tasks across

9 asked today, 112 this week

[!\[\]\(75eb2aea0849ff8e37a533bc077bab00\_img.jpg\) google-apps](#) × 1948

Questions related to interacting with Google Apps services programmatically. Consider tagging with more specific tags if relevant

10 asked this month, 127 this year

[!\[\]\(4012b3af2b794ed076c382cdd1e40834\_img.jpg\) google-apps-marketplace](#) × 559

Google Apps Marketplace contains enterprise applications that can be added to a Google Apps domain.

49 asked this year

[!\[\]\(52748cffc7fe993afcddc13876985fb3\_img.jpg\) google-apps-script-editor](#) × 84

Use for questions about Google Apps Script Editor which do not involve actual script development issues.

61 asked this year

[!\[\]\(68abec84e8e841b924f7301ab9fa69f9\_img.jpg\) google-apps-script-addon](#) × 79

Use for questions regarding editor-addons. Use in addition to any of the editors tags like [google-spreadsheet], [google-docs], slides

7 asked this month, 61 this year

[!\[\]\(f4016ba15f6497c94d6bd21b89bd5891\_img.jpg\) google-apps-for-education](#) × 65

a free suite of hosted email and collaboration applications exclusively for schools and universities.

1 asked this year

[!\[\]\(16cc0de754fd0802b4401e8468f78bfa\_img.jpg\) google-apps-script-api](#) × 31

Apps Script API makes it easy to create and publish add-ons for Google Sheets, Docs, Slides, and Forms.

30 asked this year

[!\[\]\(8fd85e19b4ec8f1c6fb29d3abb5fe928\_img.jpg\) google-apps-activity](#) × 5

The Apps Activity API lets your app retrieve information about a user's Google Apps activity.

2 asked this year

[!\[\]\(63ffbc5d6e0847ad6f9a25920abbe31e\_img.jpg\) google-apps-script-menu](#) × 4

2 asked this year

## tag synonyms



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rev 2018.10.19.31939

# Dáta, analýzy a štatistiky

Verejná skupina · 1,5 tis. členov

+ Pozvati

Informácie

Diskusia

Členovia

Podujatia

Médiá

Súbory



Create a public post...



Fotka/video



Označiť ľudí



Pocit/aktivita

Nová aktivity ▾



Pavol Skapik zdieľa odkaz.

Administrátor · 29. januára o 19:18 ·

...

Marek Krajčí vyhlásil, že po dopočítaní oneskorených údajov sa podiel pozitívnych testov v Bratislave dostał až na 1,3 percenta

BSK: Výsledky testovania v mestských častiach Bratislavы hovoria o podiele pozitívnych 0,81%, resp. všetko čo je k dispozícii je 0,88.

Čím si prosím vysvetľujete rozdiel? Ďakujem... Zobrazí viac

## Výsledky plošného skríningu



## Informácie

Skupina je len súkromným projektom, v žiadnom prípade zverejnené názory a príspevky nie sú oficiálnymi výstupmi.

### Verejná

Členov skupiny a ich príspevky bude vidieť ktokoľvek.

### Viditeľná

Túto skupinu nájde ktokoľvek

Bratislava, Slovakia

Skupina o Všeobecné

## Populárne témy v príspevkoch

census (1)

demograf...





Hľadať na Facebooku



Miroslav



# Data Analysts, Data Engineers & Data Scientists - Czech&Slovak Group

Verejná skupina · 2,3 tis. členov



+ Pozvat

Informácie

Diskusia

Oznámenia

Miestnosti

Témy

Členovia

Podujatia

Médiá



Create a public post...



Fotka/video



Označiť ľudí



Pocit/aktivita

Oznámenie · 1

Zobrazit všetko



Vojta Roček zdieľa odkaz.

★ Administrátor · 21. apríla 2017 · Prague, Praha, Česká republika ·

...

Zajímavé veci, na ktere jste prisli a chcete je posdílet. Do popisu klidne piste, proc vam to pripada zajímavé. Otazky, odpovedi, rady. Přidejte další datalidi, a ptejte se na co chcete! (Ale až po prostudování <https://www.hash.cz/inferno/otazky.html>).

Nabídky a poptávky po práci jsou v sesterské skupině -  
<https://www.facebook.com/groups/1788236724824404/>

Pokud se chystáte místních 1600 lidí oslovit zdarma s nabídkou na svou komerční akci (spam), tak to udelejte to dobre (...). [Zobrazit viac](#)

[Zobrazit preklad](#)

## Informácie

Dataflow.cz Dataflow

Twitter: <https://twitter.com/dataflowcz>

Web: <http://dataflow.cz...> [Zobrazit viac](#)

### ● Verejná

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### ● Viditeľná

Túto skupinu nájde ktokoľvek

### ● Prague, Czech Republic

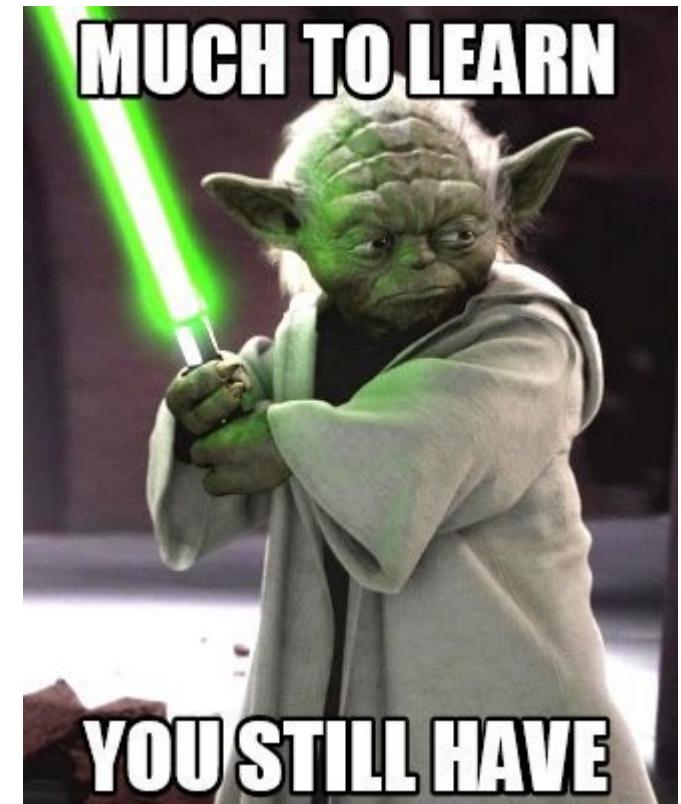
### ● Skupina o Všeobecné

## Nedáve médiá



# Čo ti odporúčam si pozrieť?

1. <https://google.github.io/styleguide/Rguide.xml>
2. <https://www.statmethods.net/input/exportingdata.html>
3. [http://www.sr.bham.ac.uk/~ajrs/R/r-function\\_list.html](http://www.sr.bham.ac.uk/~ajrs/R/r-function_list.html)
4. <https://www.statmethods.net/management/index.html>
5. <https://cran.r-project.org/web/packages/stringr/vignettes/regular-expressions.html>



Šup do záložiek

# Efektívne používanie klávesnice

**Špeciálne znaky, kde ich nájst' na klávesnici**

The diagram shows a standard QWERTY keyboard layout with a focus on special characters. The top row of keys (Numpad 0-9, Backspace, Enter) and the F1-F12 function keys are highlighted with colored boxes to show where specific symbols are located.

Operátory	Porovnávanie	Oddelovače	Bitové operácie	Zátvorky
+	< >	,	&	( )
*	=	. Atribútov		{ } Slovníky, Formát
-	!	: Blokov, Klúčov	^	[ ] Zoznamy, Indexy
/	Úvodzovky	; Príkazov	XOR	Ostatné
%	Špeciálne znaky	Poznámky	~ Inverzie	Súčasť mena
@		# Komentár	?	\$ Nevyužité

**Retázce**

! € # & # & & € !

# Ako sa s nami spojiť?



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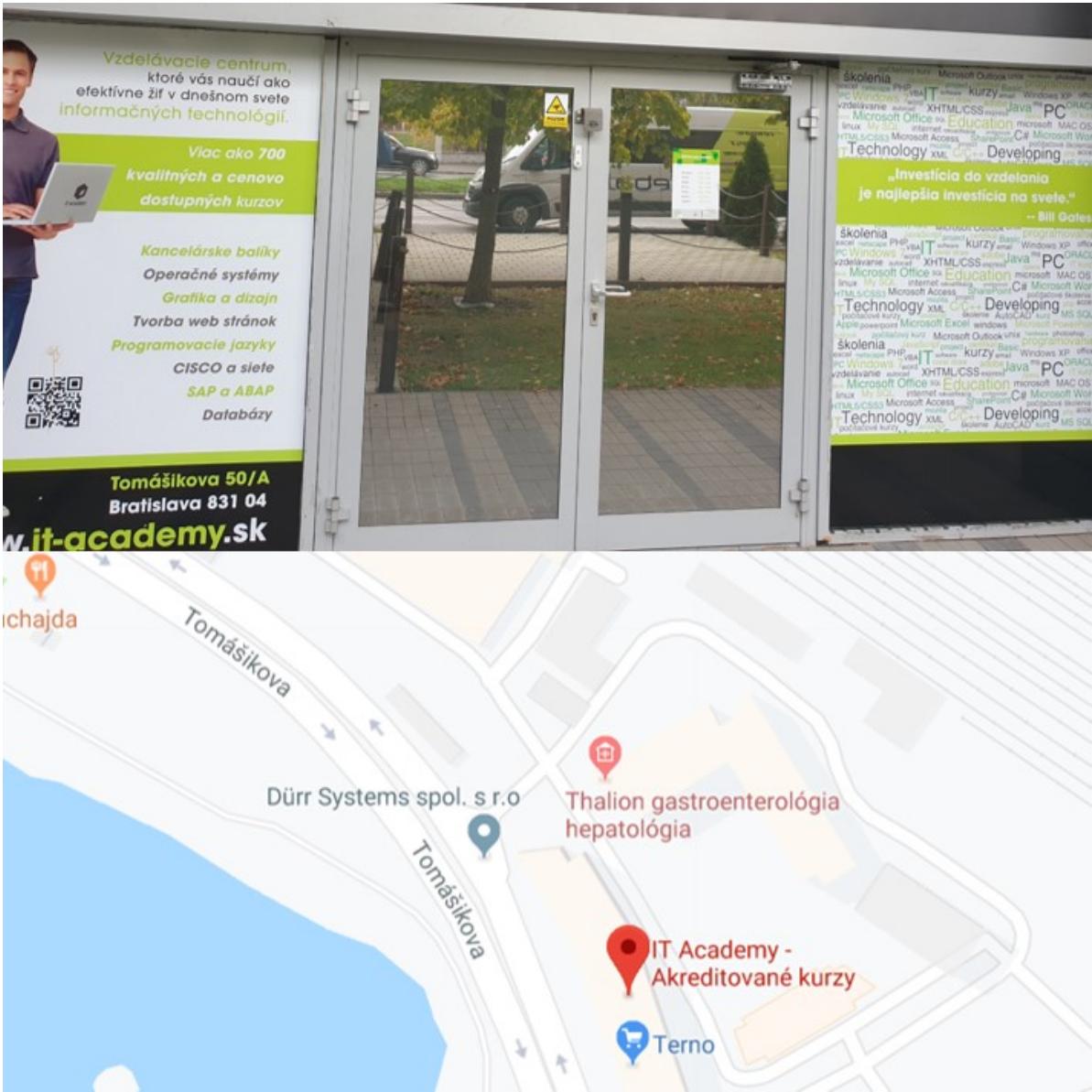
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#Kurzy

#Tréningy

#Vzdelávanie

#PPC Kampane

#Elearning

#Mentoring

#Konzultácie

#Online

#Programovanie

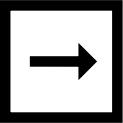
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 [WWW.YOUTUBE.COM/C/IT-ACADEMYSK](https://www.youtube.com/c/IT-ACADEMYSK) 