Stevens Institute of Technology
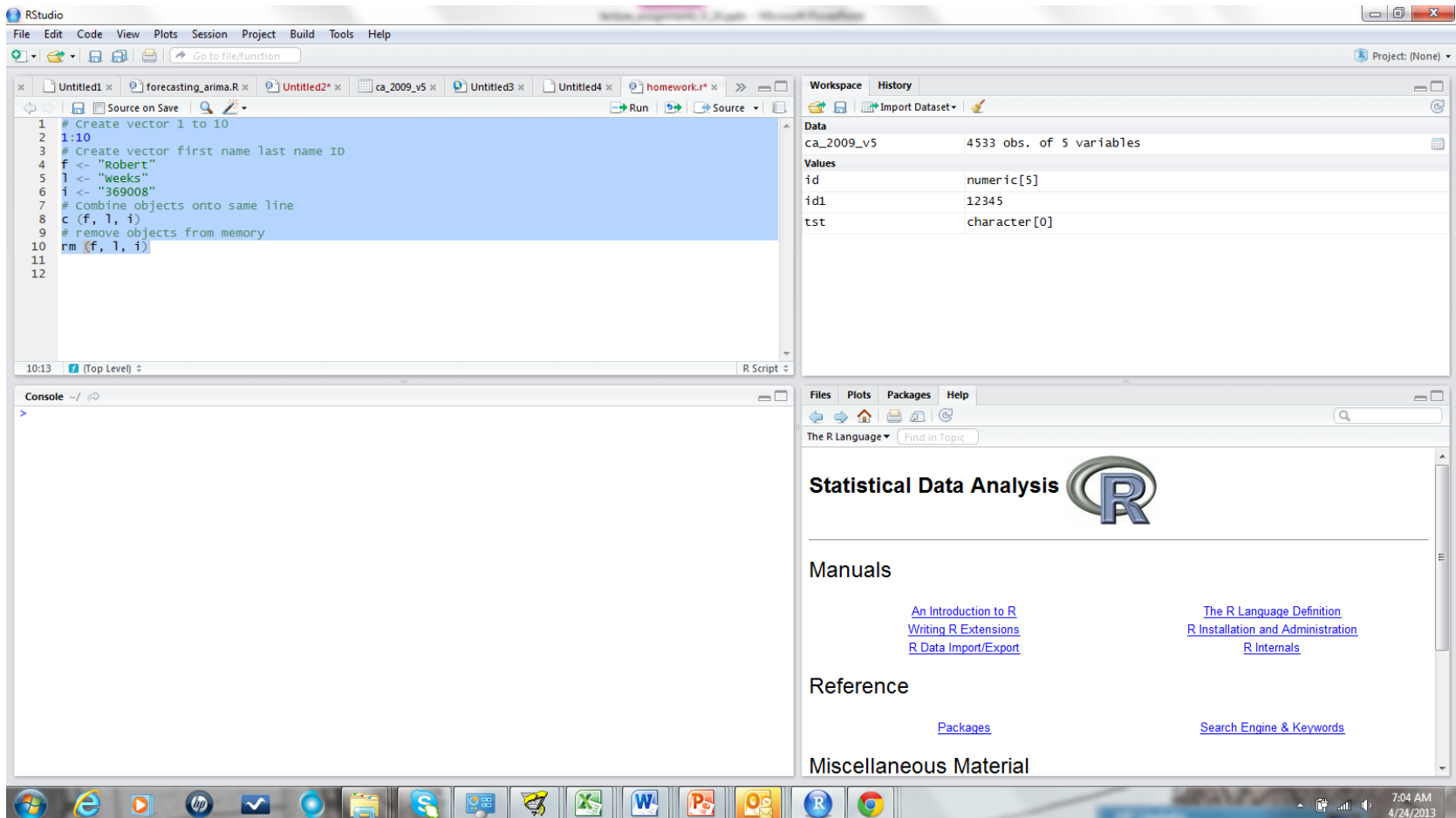
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R and R Studio Download

http://www.r-project.org/

http://www.rstudio.com/ide/download/

Intro to R: R-Studio

Intro to R Help

- **An Introduction to R**

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Intro to R: Help

- Online Manuals
  - http://127.0.0.1:40040/doc/html/index.html
- Google

Intro to R:

- R at heart is a FUNCTIONAL language

- Case sensitive -- A and a are different

- All alphanumeric symbols and '.' , '_'

- ';' is a separator

Intro to R: Elements in R

- Simple Data Types

- Operators

- Vectors

- Functions

- List and Data Frame

- Expressions

- Packages and Libraries

Intro to R: Simple data types

- Most Common SIMPLE data types in R:

  - Integer

  - Float

  - Double

  - Booleans

  - Characters

  - Complex

  - NA

Intro to R: Comments

- # this is a Line Comment

- # Course : My course
- # First Name : Khasha
- # Last Name : Dehnad
- # Id : 12345

Intro to R: Operators

- ➢ Default prompt

   >

    +

- ➢ Operators

        +

        -

        *

        /

        ^

- ➢ Assignment operator

        <-

        =   We use '=' for passing parameters or assigning names only

Intro to R: Vector

- ► Vector is the simplest structure in R.

- ► The elements in a vector are the same data type.

Intro to R: Some Vector Constructors

- C()
  - ‣ x<-c(10,5,6,6,6,7)
  - ‣ y<-c('My First Name','My last Name')
- seq() and :
  - ‣ seq(1,4,0.5)
  - ‣ 1:10
- rep()
  - ‣ > rep(5,10)

Intro to R: Help Functions

- **R Built-in Help Functions**

    - ▸ >help(xxx)

    - ▸ >?xxx

    - ▸ >help.start()

    - ▸ > example(xxx)

Intro to R: Functions

Some vector and mathematical functions

sort(x)	Sort the elements of x.
rev(x)	Reverse the order of the elements of x.
rank(x)	Ranks of the elements of x.
log(x,base)	The logarithms of all elements of x in base base.
exp(x)	The exponentials of the elements of x.
sqrt(x)	The square roots of the elements of x.
abs(x)	The absolute value of the elements of x.
round(x,n)	Rounds all elements of x to n decimal places.
cumsum(x)	Returns a vector where the ith element is the sum from $x[1]$ to $x[i]$.
cumprod(x)	The same for the product.
match(x,s)	Returns a vector with the same length as x, with the elements of x that are contained in s. The ones that do not belong to s have the value NA.
union(x,y)	Returns a vector with the union of vectors x and y.
intersect(x,y)	Returns a vector with the intersection of vectors x and y.
setdiff(x,y)	Returns a vector resulting from removing the elements of y from x.
is.element(x,y)	Return TRUE if x is contained in vector y.
choose(n,k)	Calculates the number of combinations of k n to n.

Intro to R: Functions

Some basic statistics

`sum(x)`	Sum of the elements of x.
`max(x)`	Largest value of the elements in x.
`min(x)`	Smallest value of the elements in x.
`which.max(x)`	The index of the largest value in x.
`which.min(x)`	The index of the smallest value in x.
`range(x)`	The range of values in x (has the same result as `c(min(x),max(x))`).
`length(x)`	The number of elements of x.
`mean(x)`	The mean value of the elements of x.
`median(x)`	The median value of the elements of x.
`sd(x)`	The standard deviation of the elements of x.
`var(x)`	The variance of the elements of x.
`quantile(x)`	The quantiles of x.
`scale(x)`	Standardizes the elements of x, *i.e.* subtracts the mean and divides by the standard deviation. Results in a vector with zero mean and unit standard deviation. Also works with data frames (column-wise and only with numeric data!).

Intro to R : Vector Recycling Rule

- **>1:2+1:4**

$$\begin{bmatrix} 1 \\ 2 \end{bmatrix} + \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 1 \\ 2 \end{bmatrix} + \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} = \begin{bmatrix} 2 \\ 4 \\ 4 \\ 6 \end{bmatrix}$$

- **>1:4+1:7**

$$\begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \end{bmatrix} + \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 1 \\ 2 \\ 3 \end{bmatrix} + \begin{bmatrix} 1 \\ 2 \\ 3 \\ 4 \\ 5 \\ 6 \\ 7 \end{bmatrix} = \begin{bmatrix} 2 \\ 4 \\ 6 \\ 8 \\ 6 \\ 8 \\ 10 \end{bmatrix}$$

Intro to R: Managing the environment

- ▸ mode()

- ▸ length()

- ▸ ls()

- ▸ library()

- ▸ installed.packages()

- ▸ rm ()

- ▸ setdiff()

Intro to R: List

- Lists consist of an ordered collection of other objects known as its components.

- These components do not need to be of the same type, mode or length

 my.lst <- list(stud.id=34453, stud.name="John", stud.marks=c(14.3,12,15,19))

Intro to R : Dataframe

- Dataframe is a list of vectors of equal length

```
my.dataset <- data.frame(site=c('A','B','A','A','B'),
season=c('Winter','Summer','Summer','Spring','Fall'),
pH = c(7.4,6.3,8.6,7.2,8.9))

my.dataset <-
read.table("path",Header=T,sep='/t')

my.dataset<-
read.csv("http://www.math.smith.edu/sasr/datasets/help.csv")
```