# Graphic visualization of data

just scratch the surface

# The graphic page

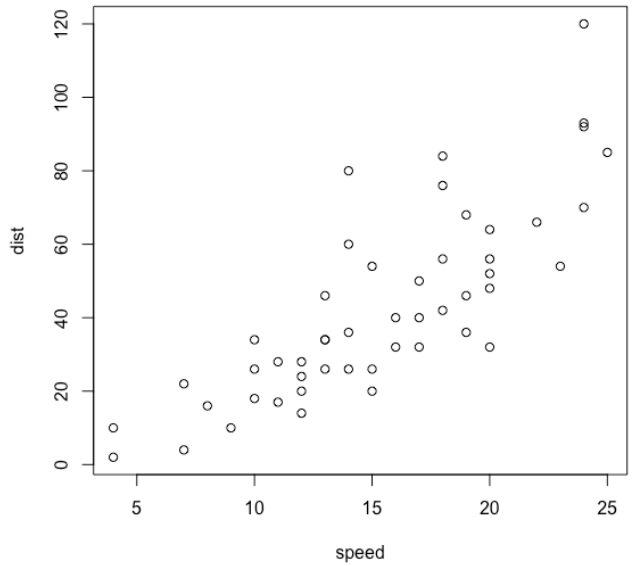
- Graphic functions add drawing components to the graphic page
- main functions (non exhaustive)
  - **`plot`**
  - **`hist`**
  - **`barplot`**
  - **`boxplot`**
  - **`pie`**
- additional components (non exhaustive)
  - **`lines`**
  - **`abline`**
  - **`text`**
  - **`axis`**

In the following, with "plot" in standard character we will mean a generig graphic function, while with **`plot`** we will mean the specific function with that name

# Standard components and default values

- plot functions have a set of standard components and default values
  - in many cases default values are drawn from data, e.g. column names in data frames
- graphic appearance can be highly personalised
- by default, if the parameter is a two-columns dataframe we obtain a scatter plot of the columns

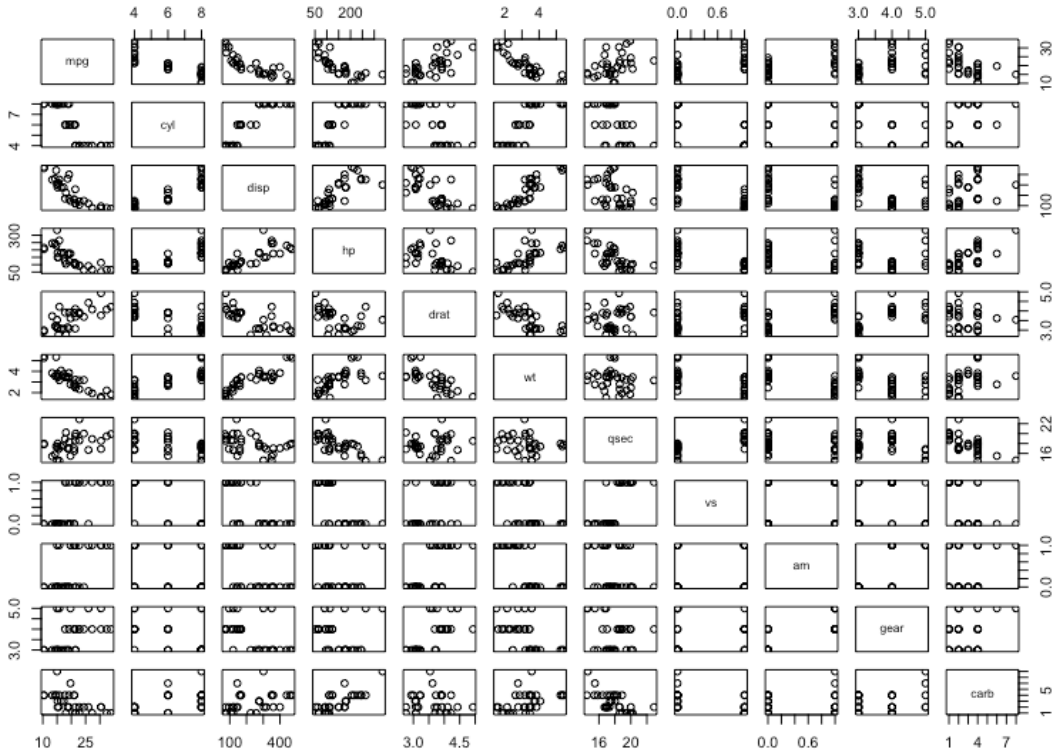
```
# plot data from the predefined dataframe cars
# a dataframe with two columns (dist,speed)
# Speed and Stopping Distances of Cars (ethz.ch)
plot(cars)
```



# Standard components and default values

```
# plot data from the
# predefined
# dataframe mtcars
plot(mtcars)
```

- by default, if the parameter is a many-columns dataframe we obtain the *pair-plot*
  - scatter plot of all the pairs
- mtcars

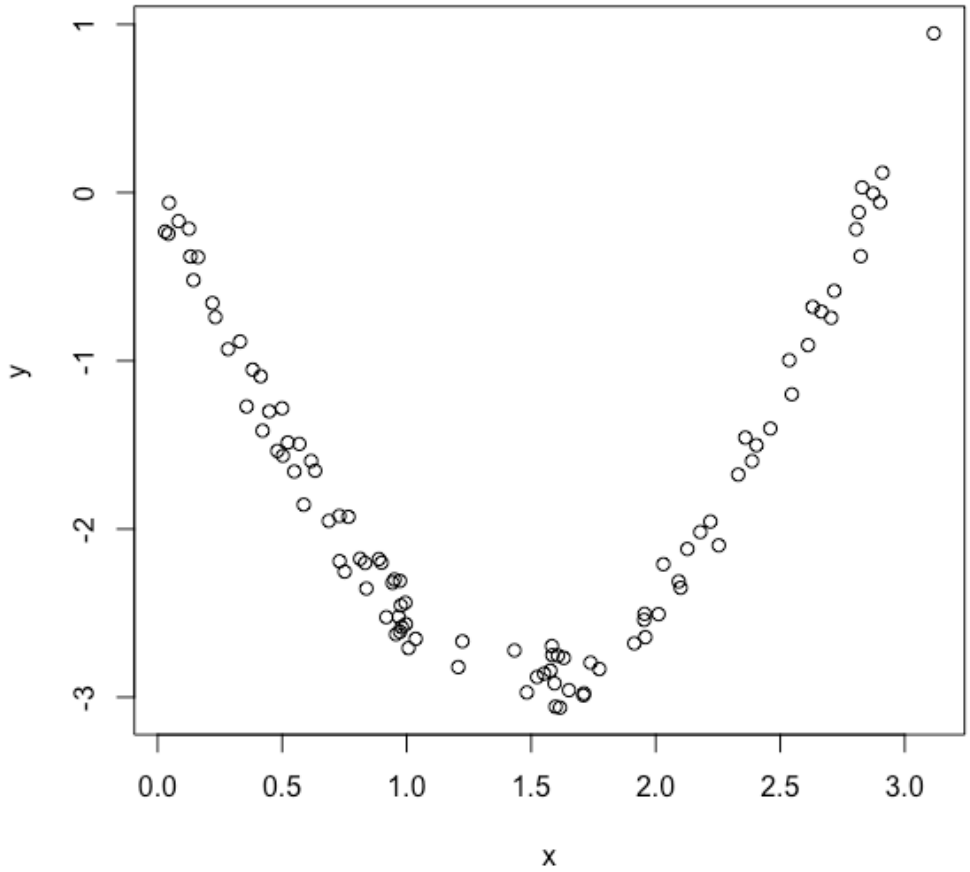


# Standard components (non-exhaustive)

- x label, ticks, values, ... (same for y)
- types
  - “p”: Points (default)
  - “l”: Lines
  - “b”: Both
  - “c”: The lines part alone of “b”
  - “o”: Both “overplotted”
  - “h”: **Histogram** like (or high-density) vertical lines.
  - “n”: No plotting.

# Plot output type

```
rm(list = ls())
fun <- function(x){
  noise <- 0.2
  y <- 0.1*x^2-pi*sin(x)
    + noise * runif(n,-1,1)
}
n <- 100
seed <- 1234
set.seed(seed)
x <- runif(n,0,pi)
y <- fun(x)
plot(x,y)
```



# Plot output type

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rm(list = ls())
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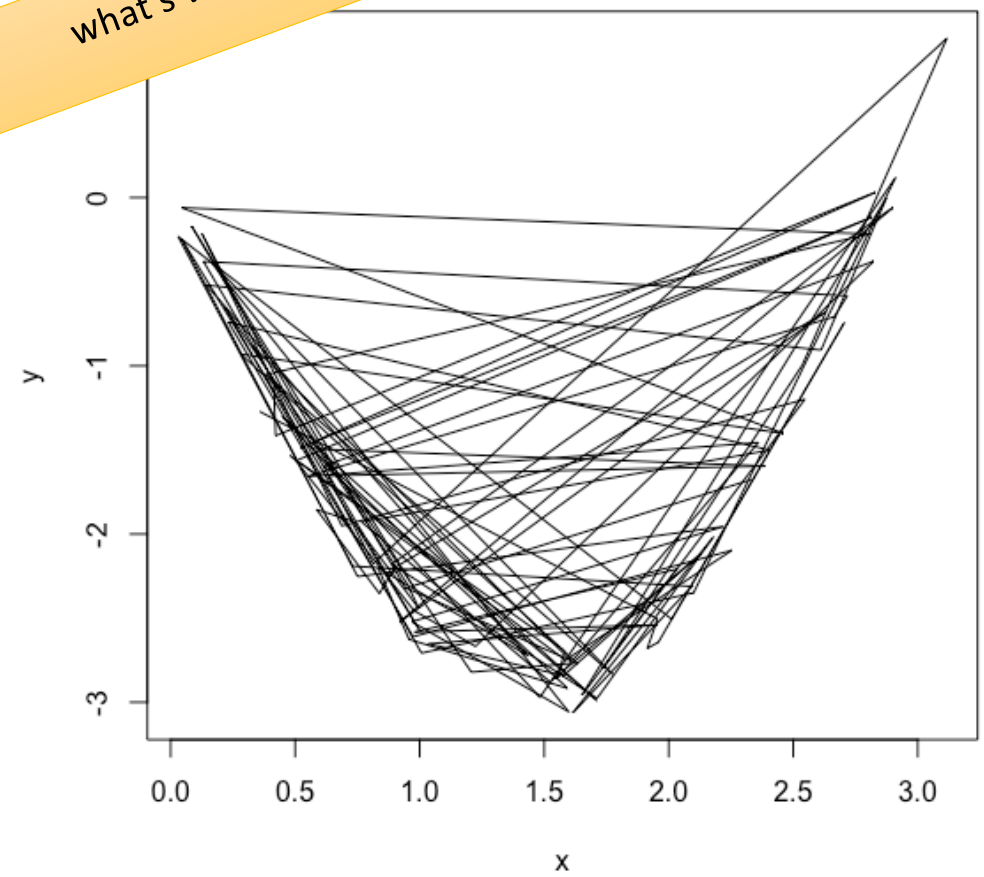
  noise <- 0.2
  y <- 0.1*x^2-pi*sin(x)
    + noise * runif(n,-1,1)
}
n <- 100
seed <- 1234
set.seed(seed)
x <- runif(n,0,pi)
y <- fun(x)
plot(x,y,type = "l")
```

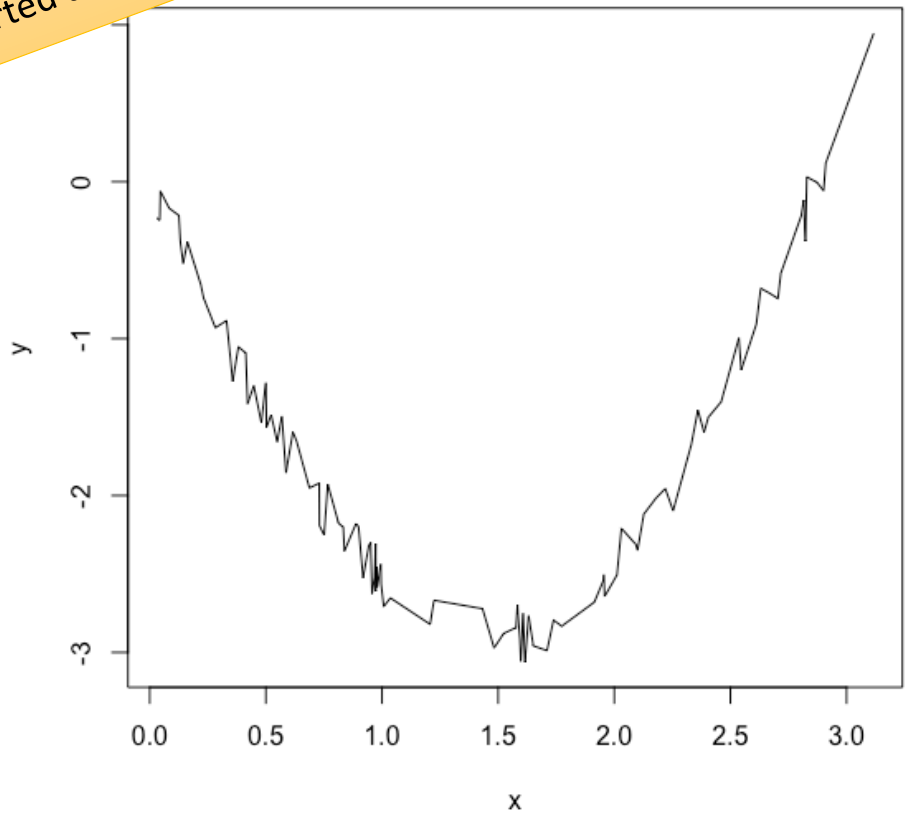
what's wrong?



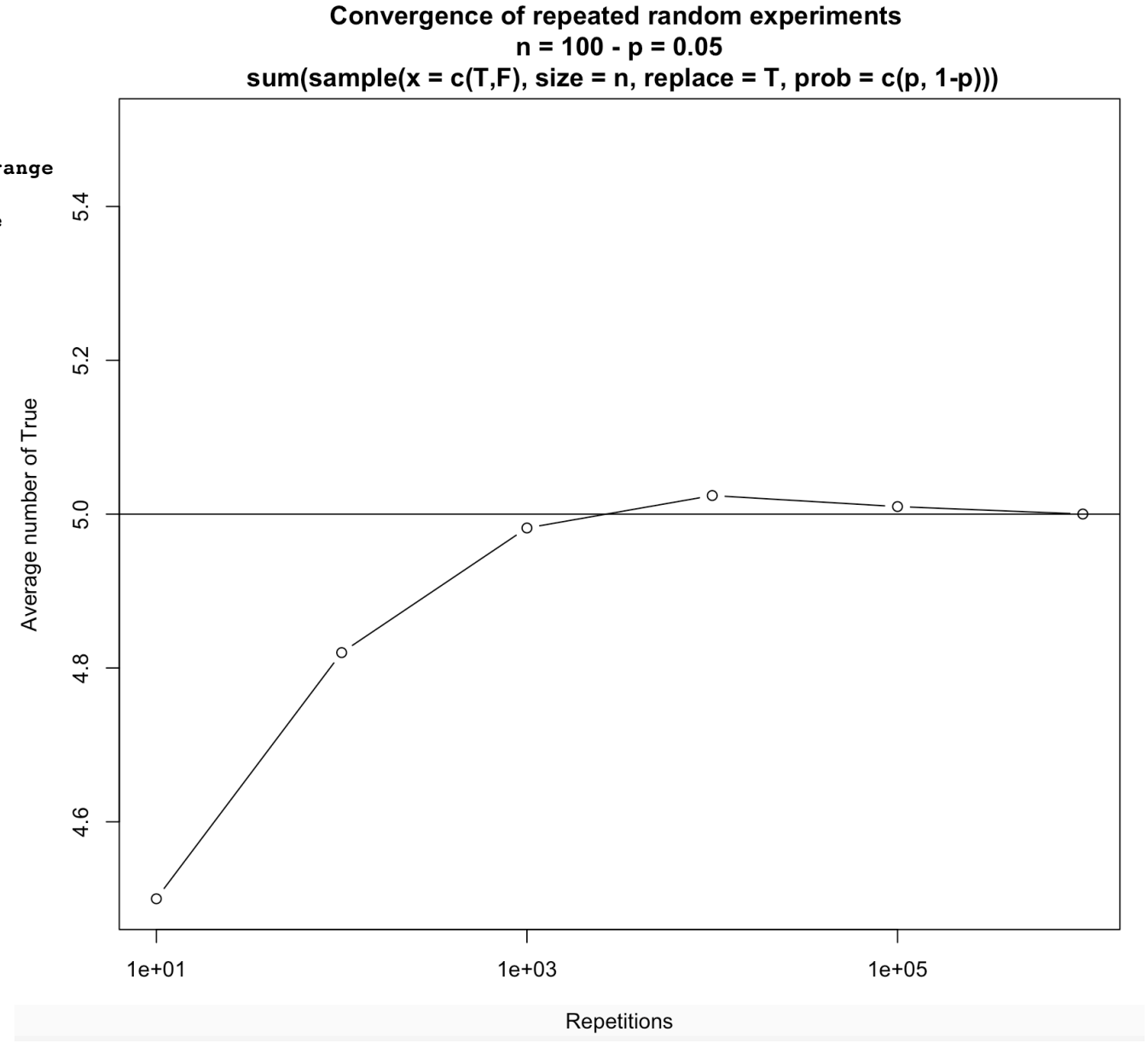
# Plot output type

plotting lines requires the
x data to be ***sorted***
y data must be sorted accordingly

```
...
x <- runif(n,0,pi)
y <- fun(x)
o_x<- order(x)
   # the index sequence that makes x
sorted
x <- x[o_x]
   # reuse the same variables
y <- y[o_x]
plot(x,y, type = "l")
```



```
plot(x = 10^plotRange, y = avgT, type = "b",
     main = mainTitle,
     xlab = "Repetitions",
     log = "x",
     ylab = "Average number of True",
     ylim = c(n*p*0.9,n*p*1.1) # adjust the y label range
)
abline(h = as.integer((n*p))) # put a horizontal line
```



```
hist(outcome
     , main = histTitle
     , xlab = "Outcome"
)
```