

First R Experience

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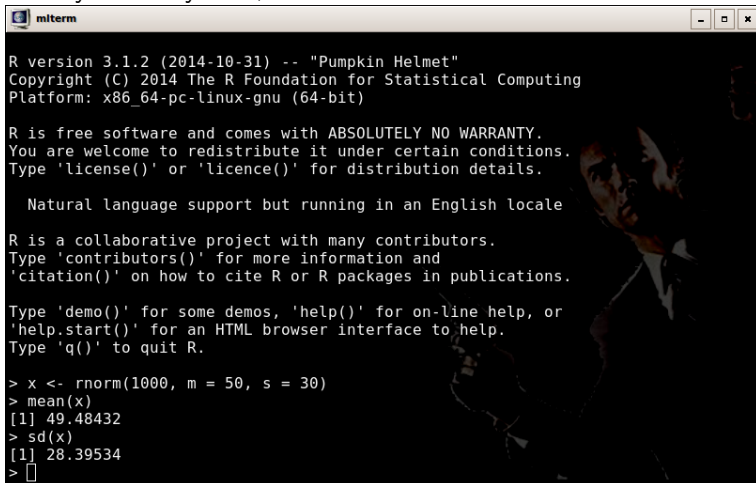
Install R

If you are using your own computer, GET R AND INSTALL IT. Try this BEFORE THE FIRST class meets. If the install fails, get help and fix it!

- R freely downloadable for Linux, MS Windows, and Macintosh from <http://rweb.quant.ku.edu/cran> (or any other R mirror).
- I have some tips about installing R for Windows on the CRMDA website <http://crmda.ku.edu/windows-admin-tips>
- The priority is to install R and make sure it works.
- Later, worry about getting a GOOD PROGRAM EDITOR. Mac's R.app is OK, but the "with R" editor in Windows is not adequate. I use Emacs, but many also enjoy Notepad++ with NPPTOR or RStudio.

R Terminal Looks like this

On my Linux system, the “R console”:



```
mlterm

R version 3.1.2 (2014-10-31) -- "Pumpkin Helmet"
Copyright (C) 2014 The R Foundation for Statistical Computing
Platform: x86_64-pc-linux-gnu (64-bit)

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

  Natural language support but running in an English locale

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

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

> x <- rnorm(1000, m = 50, s = 30)
> mean(x)
[1] 49.48432
> sd(x)
[1] 28.39534
> █
```

R Terminal Looks like this

On Fan Jia's Windows computer:

A screenshot of the RGui (64-bit) application window on a Windows computer. The window title is "RGui (64-bit)" and it has a menu bar with "File", "Edit", "View", "Misc", "Packages", "Windows", and "Help". Below the menu bar is a toolbar with icons for file operations. The main area is titled "R Console" and displays the R startup message. The text in the console is:

```
R version 2.15.1 (2012-06-22) -- "Roasted Marshmallows"
Copyright (C) 2012 The R Foundation for Statistical Computing
ISBN 3-900051-07-0
Platform: x86_64-pc-mingw32/x64 (64-bit)

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Type 'q()' to quit R.

> |
```

Type At the > Prompt!

- In the future, we won't type at the > prompt. Nothing you type there is “remembered” for future revision.
- We will write commands in separate “script” files.
- But, right now, just enjoy the immediate gratification of typing commands into R and watching stuff fly out of your computer.

Start the R Terminal. Try this!

```
> x <- c(3, 5, 7, 9, 11)
> x
```

```
[1] 3 5 7 9 11
```

```
> mean(x)
```

```
[1] 7
```

```
> var(x)
```

```
[1] 10
```

Start the R Terminal

- Note that

```
> x
```

```
[1] 3 5 7 9 11
```

- Is the exact same as

```
> print(x)
```

```
[1] 3 5 7 9 11
```

- Because typing a thing's name tells R to use the print function to display it.

Your first statistics in the R Terminal

```
> y <- c(4, -2, 3, 5, 1)
> mean(x)
```

```
[1] 7
```

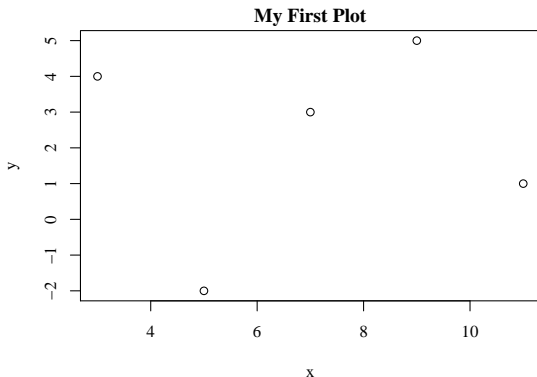
```
> var(x)
```

```
[1] 10
```


Your first plot, launched from the R Terminal

- This should launch a graphic image in a separate display window

```
> plot(y ~ x, main = "My First Plot")
```



Your first random samples, from the R Terminal

- Lets draw 40 observations, one set from a “normal” (or Gaussian) distribution, one from a Poisson distribution:

```
> x <- rnorm(40, m = 7, sd = 10)
> y <- rpois(40, lambda = 11)
```

- Use the `head()` function to check the first few values of each one

```
> head(x)
```

```
[1] 14.7289941 38.0548599 24.7693975 0
     .4372007 -14.0786412 5.6243403
```

```
> head(y)
```

```
[1] 13 14 8 13 16 11
```

Tidbit about Random Numbers and Reproducibility

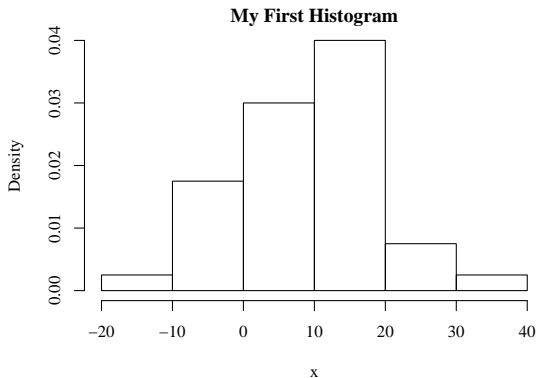
- If you run “`rnorm(40, m = 7, sd = 10)`” over again, you will get a different (unpredictable) set of numbers every time
- It is possible to re-draw the same random numbers, over and over, if you re-set the random number generator.

```
> set.seed(66565) #put in any integer you like  
> x <- rnorm(40, m = 7, sd = 10)  
> y <- rpois(40, lambda = 11)
```

- Homework: Use the `head()` function to view `x` and `y`, then run those 3 lines over a few times.

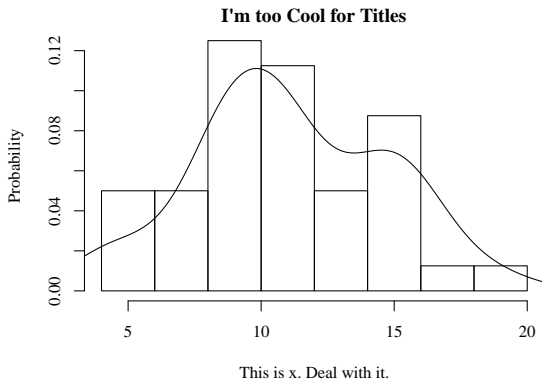
Create a histogram of x

```
> hist(x, prob = TRUE, main = "My First Histogram")
```



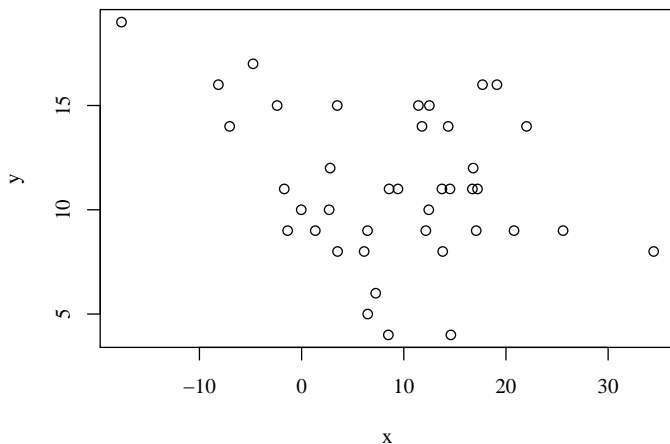
Embellish a plot by drawing on it

```
> hist(y, prob = TRUE, main = "I'm too Cool for Titles",  
      xlab = "This is x. Deal with it.", ylab = "Probability")  
> yden <- density(y)  
> lines(yden) ## lines is a "method." Will explain later :)
```



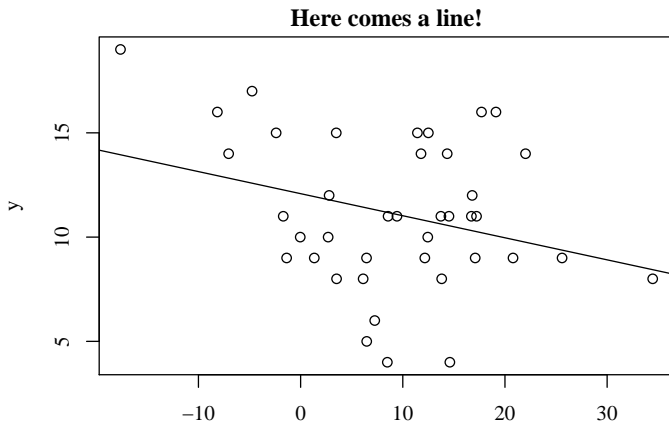
Plot the Poisson y against the normal x variable

```
> plot(y ~ x)
```



Start the R Terminal

```
> plot(y ~ x, main = "Here comes a line!")  
> mod1 <- lm(y ~ x)  
> abline(mod1)
```



Just one more thing before finishing

- R allows many output file formats for graphics (pdf, png, jpg, etc)
- To save graphics, I prefer pdf format and I run this:

```
> pdf("RegPlot1.pdf", height = 5, width = 7,  
      paper = "special")  
> plot(y ~ x, main = "Here comes a line!")  
> mod1 <- lm(y ~ x)  
> abline(mod1)  
> dev.off() # finishes the actual output file
```


Did R create a PDF file for you?

- Hopefully, when you ran those commands, R created “RegPlot1.pdf”.
- Maybe that failed! (Perhaps you don't have “write permission” in the directory where R wants to put the file.)
- That's embarrassing, I did not think to warn you! You shouldn't have trusted me.
- Here are some hints to find your file. Run this:

```
> list.files ()
```

and this

```
> getwd ()
```

- In First-R-03, I will explain what's going on.