

Foundations II Handout

1 Very First Commands

Should only need to do once on each computer.

```
> install.packages('NCStats',, 'http://www.rforge.net/')
```

2 First Commands

```
> library(NCStats)
```

3 Basic Mathematics

```
> 3-pi
[1] -0.1415927
> junk <- 3-pi
> junk
[1] -0.1415927
> b <- 3.8
> h <- 4.2
> (1/2)*b*h
[1] 7.98
> result <- log(17)
> ls()
[1] "b"      "h"      "junk"   "result"
```

4 Basic Vectors

```
> nums <- c(4,2,6,4,3)
> nums
[1] 4 2 6 4 3
> profs <- c("Derek", "Young", "Jeffry", "Laura")
> profs
[1] "Derek" "Young" "Jeffry" "Laura"
```

```

> heads <- c(TRUE, TRUE, FALSE, FALSE)
> heads

[1] TRUE TRUE FALSE FALSE

> nums[3]

[1] 6

> profs[4]

[1] "Laura"

> heads[1]

[1] TRUE

> ls()

[1] "b"      "h"      "heads"  "junk"   "nums"   "profs"  "result"

```

5 Basic Data Frames

You must change the directory with the File...Change Dir menu or `setwd()` (as below, but for your directory) before the following command

```

> setwd("C://aaaWork//Class Materials//MTH107//Lecture//HOs//")

> perch <- read.table("PerchGL.txt",header=TRUE)
> view(perch)

   fl   w year
1   59  2.5 1994
5   66  3.9 1994
25 105 13.2 1994
49  71  3.9 2000
81 166 50.1 2000
82  68  4.3 2000

> perch[2,]

   fl   w year
2  60  2.5 1994

> perch$w

 [1] 2.5 2.5 3.3 3.6 3.9 4.1 4.4 4.8 5.0 5.6 6.2 6.2 6.3 6.3 7.8 7.8 9.1
[18] 9.5 9.8 9.8 11.0 11.5 13.2 12.9 13.2 14.5 16.2 19.1 19.5 6.3 6.0 6.5 6.6 4.3
[35] 4.6 4.6 5.2 5.9 14.1 12.6 13.2 2.1 2.6 2.6 3.3 3.5 3.5 3.9 3.9 4.1 4.2
[52] 4.5 4.8 5.0 5.4 5.5 6.0 6.6 7.2 7.9 8.3 9.5 9.5 10.5 11.2 10.7 12.3 12.9
[69] 12.6 14.5 14.5 15.8 18.2 18.2 18.2 16.2 21.4 31.6 28.8 35.5 50.1 4.3 4.3 4.4 4.9
[86] 5.1 5.5 5.9 6.8 7.8 8.1 8.9 10.0 10.0 11.0 11.7 12.9 13.5 15.1 15.1

```

```

> perch$w[3]

[1] 3.3

> ls()

[1] "b"      "h"      "heads"  "junk"   "nums"   "perch"  "profs"  "result"

```

6 Working With Data Frames

```

> attach(perch)
> w

 [1] 2.5 2.5 3.3 3.6 3.9 4.1 4.4 4.8 5.0 5.6 6.2 6.2 6.3 6.3 7.8 7.8 9.1
[18] 9.5 9.8 9.8 11.0 11.5 13.2 12.9 13.2 14.5 16.2 19.1 19.5 6.3 6.0 6.5 6.6 4.3
[35] 4.6 4.6 5.2 5.9 14.1 12.6 13.2 2.1 2.6 2.6 3.3 3.5 3.5 3.9 3.9 4.1 4.2
[52] 4.5 4.8 5.0 5.4 5.5 6.0 6.6 7.2 7.9 8.3 9.5 9.5 10.5 11.2 10.7 12.3 12.9
[69] 12.6 14.5 14.5 15.8 18.2 18.2 18.2 16.2 21.4 31.6 28.8 35.5 50.1 4.3 4.3 4.4 4.9
[86] 5.1 5.5 5.9 6.8 7.8 8.1 8.9 10.0 10.0 11.0 11.7 12.9 13.5 15.1 15.1

> w[3]

[1] 3.3

> w[c(2,4,6)]

[1] 2.5 3.6 4.1

> w[-c(2,4,6)]

 [1] 2.5 3.3 3.9 4.4 4.8 5.0 5.6 6.2 6.2 6.3 6.3 7.8 7.8 9.1 9.5 9.8 9.8
[18] 11.0 11.5 13.2 12.9 13.2 14.5 16.2 19.1 19.5 6.3 6.0 6.5 6.6 4.3 4.6 4.6 5.2
[35] 5.9 14.1 12.6 13.2 2.1 2.6 2.6 3.3 3.5 3.5 3.9 3.9 4.1 4.2 4.5 4.8 5.0
[52] 5.4 5.5 6.0 6.6 7.2 7.9 8.3 9.5 9.5 10.5 11.2 10.7 12.3 12.9 12.6 14.5 14.5
[69] 15.8 18.2 18.2 18.2 16.2 21.4 31.6 28.8 35.5 50.1 4.3 4.3 4.4 4.9 5.1 5.5 5.9
[86] 6.8 7.8 8.1 8.9 10.0 10.0 11.0 11.7 12.9 13.5 15.1 15.1

> perch[3,2]

[1] 3.3

> perch[3,]

  fl   w year
3 63 3.3 1994

> perch[c(1,3,5),]

  fl   w year
1 59 2.5 1994
3 63 3.3 1994
5 66 3.9 1994

```

```
> attached()

[1] "perch"

> detach(perch)
```

7 Subsetting Data Frames

7.1 The Basics

```
> data(iris)
> str(iris)

'data.frame':      150 obs. of  5 variables:
 $ Sepal.Length: num  5.1 4.9 4.7 4.6 5 5.4 4.6 5 4.4 4.9 ...
 $ Sepal.Width : num  3.5 3 3.2 3.1 3.6 3.9 3.4 3.4 2.9 3.1 ...
 $ Petal.Length: num  1.4 1.4 1.3 1.5 1.4 1.7 1.4 1.5 1.4 1.5 ...
 $ Petal.Width : num  0.2 0.2 0.2 0.2 0.2 0.4 0.3 0.2 0.2 0.1 ...
 $ Species      : Factor w/ 3 levels "setosa","versicolor",...: 1 1 1 1 1 1 1 1 1 1 ...
```

```
> view(iris,n=10)
```

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
7	4.6	3.4	1.4	0.3	setosa
12	4.8	3.4	1.6	0.2	setosa
20	5.1	3.8	1.5	0.3	setosa
32	5.4	3.4	1.5	0.4	setosa
53	6.9	3.1	4.9	1.5	versicolor
67	5.6	3.0	4.5	1.5	versicolor
114	5.7	2.5	5.0	2.0	virginica
121	6.9	3.2	5.7	2.3	virginica
149	6.2	3.4	5.4	2.3	virginica
150	5.9	3.0	5.1	1.8	virginica

```
> iris.set <- subset(iris,Species=="setosa")
> view(iris.set)
```

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
4	4.6	3.1	1.5	0.2	setosa
15	5.8	4.0	1.2	0.2	setosa
18	5.1	3.5	1.4	0.3	setosa
21	5.4	3.4	1.7	0.2	setosa
22	5.1	3.7	1.5	0.4	setosa
47	5.1	3.8	1.6	0.2	setosa

```
> iris.gt5 <- subset(iris,Sepal.Length>5)
> view(iris.gt5)
```

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
51	7.0	3.2	4.7	1.4	versicolor
72	6.1	2.8	4.0	1.3	versicolor
77	6.8	2.8	4.8	1.4	versicolor
99	5.1	2.5	3.0	1.1	versicolor

```
131      7.4      2.8      6.1      1.9 virginica
137      6.3      3.4      5.6      2.4 virginica
```

```
> iris.setver <- subset(iris,Species=="setosa" | Species=="versicolor")
> view(iris.setver)
```

```
      Sepal.Length Sepal.Width Petal.Length Petal.Width Species
4         4.6         3.1         1.5         0.2      setosa
13        4.8         3.0         1.4         0.1      setosa
17        5.4         3.9         1.3         0.4      setosa
54        5.5         2.3         4.0         1.3 versicolor
56        5.7         2.8         4.5         1.3 versicolor
67        5.6         3.0         4.5         1.5 versicolor
```

```
> iris.setver1 <- subset(iris,Species!="virginica")
> view(iris.setver1)
```

```
      Sepal.Length Sepal.Width Petal.Length Petal.Width Species
9         4.4         2.9         1.4         0.2      setosa
16        5.7         4.4         1.5         0.4      setosa
43        4.4         3.2         1.3         0.2      setosa
55        6.5         2.8         4.6         1.5 versicolor
72        6.1         2.8         4.0         1.3 versicolor
96        5.7         3.0         4.2         1.2 versicolor
```

```
> iris.setgt5 <- subset(iris,Species=="setosa" & Sepal.Length>5)
> view(iris.setgt5)
```

```
      Sepal.Length Sepal.Width Petal.Length Petal.Width Species
19         5.7         3.8         1.7         0.3      setosa
20         5.1         3.8         1.5         0.3      setosa
22         5.1         3.7         1.5         0.4      setosa
40         5.1         3.4         1.5         0.2      setosa
47         5.1         3.8         1.6         0.2      setosa
49         5.3         3.7         1.5         0.2      setosa
```

```
> ls()
```

```
[1] "b"          "h"          "heads"     "iris"      "iris.gt5"
[6] "iris.set"   "iris.setgt5" "iris.setver" "iris.setver1" "junk"
[11] "nums"      "perch"     "profs"     "result"
```