

S-plus Examples

Finding Class Datasets

See what's in the class directory and in the WWW directory

```
tree1:~> ls /usr/class/stats202
DATA WWW
tree1:~> ls /usr/class/stats202/DATA
housing.data housing.info income.data income.info spam.data
```

Copy the Boston housing data into your home directory:

```
tree1:~/stats202> cp /usr/class/stats202/DATA/housing.data housing.data
```

Read Data Into S-Plus

```
S-PLUS : Copyright (c) 1988, 2000 MathSoft, Inc.
S : Copyright Lucent Technologies, Inc.
Version 6.0 Release 1 for Sun SPARC, SunOS 5.6 : 2000
Working data will be in /afs/ir/users/i/b/ibelit/MySwork
```

```
> boston _ read.table("housing.data", header=T)
```

Getting Help

The best way to get help in S-Plus is to open help window at the beginning of you S-Plus session:

```
> help.start()
```

Working With Data

```
> #You can make comments with '#' in S-Plus
> dim(boston)
[1] 506 14
> names(boston)
[1] "crim" "zn" "indus" "chas" "nox" "rm" "age"
[8] "dis" "rad" "tax" "ptratio" "b" "lstat" "medv"
> #the following command gives you a summary for each variable in the data:
> summary(boston)
      crim      zn      indus      chas
```

```

      Min.: 0.006320      Min.: 0.00      Min.: 0.460      Min.:0.00000
1st Qu.: 0.082045      1st Qu.: 0.00      1st Qu.: 5.190      1st Qu.:0.00000
  Median: 0.256510      Median: 0.00      Median: 9.690      Median:0.00000
   Mean: 3.613524      Mean: 11.36      Mean:11.137      Mean:0.06917
3rd Qu.: 3.677083      3rd Qu.: 12.50      3rd Qu.:18.100      3rd Qu.:0.00000
   Max.:88.976200      Max.:100.00      Max.:27.740      Max.:1.00000
> #Access parts of data
> boston[12:15, 1:3]
      crim  zn indus
12 0.11747 12.5  7.87
13 0.09378 12.5  7.87
14 0.62976  0.0  8.14
15 0.63796  0.0  8.14
> boston$crim
 [1] 0.00632 0.02731 0.02729 0.03237 0.06905 0.02985 0.08829 0.14455
 [9] 0.21124 0.17004 0.22489 0.11747 0.09378 0.62976 0.63796 0.62739
[17] 1.05393 0.78420 0.80271 0.72580 1.25179 0.85204 1.23247 0.98843
...
> sqrt(var(boston$rm)) #standard deviation of the number of rooms
[1] 0.7026171

```

Graphics

```

> #open a graphics window
> motif()

> #make a histogram for the variable "indus":
> hist(boston$indus)

> #get a density estimate and plot it:
> d _ density(boston$indus)
> plot(d$x, d$y, type="l")
> title("Proportion of Non-Retail Business Acres")

> #split the graphics window into 2 parts (1 by 2):
> par(mfrow=c(1,2))

> #place two histograms on same page:
> hist(boston$medv[boston$chas==1])
> title("tract bounds river")
> hist(boston$medv[boston$chas==0])
> title("otherwise")

> par(mfrow=c(1,1)) #back to one window
> #make a scatterplot of medv vs lstat:

```

```

> plot(boston$lstat, boston$medv)
> #add a smoothing spline to the existing graph:
> lines(smooth.spline(boston$lstat, boston$medv))
> title("medv vs lstat")

> #make pairwise scatterplots for selected variables:
> my.variables _ c(1,3,6,7,13,14)
> pairs(boston[, my.variables])

> #make 4 boxplots side by side
> #notice outliers in crime rates!
> boxplot(boston$indus, boston$lstat, boston$crim, boston$medv,
          names = c("indus", "lstat", "crim", "medv"), main = "Boxplots")

> #save graph in a file
> printgraph(file="boxplot.ps")

> #the function brush allows interaction with the scatterplot matrix:
> brush(as.matrix(boston))
> #try rotating points in 3D and highlighting them to see how they
> #are linked in the scatterplots.

```

Basic Data Manipulation

```

> #create your own data
> x_c(1,2,3,4)
> x
[1] 1 2 3 4
> x*3
[1] 3 6 9 12
> y _ matrix(c(1,2,3,4),2,2)
> y
      [,1] [,2]
[1,]    1    3
[2,]    2    4
> y[2,1]
[1] 2
> 5*y
      [,1] [,2]
[1,]    5   15
[2,]   10   20
> z _ matrix(c(4,5,6,7,8,9),3,2)
> z
      [,1] [,2]
[1,]    4    7

```

```

[2,] 5 8
[3,] 6 9
> t(z) #transpose
      [,1] [,2] [,3]
[1,] 4 5 6
[2,] 7 8 9
> z %**% y
      [,1] [,2]
[1,] 18 40
[2,] 21 47
[3,] 24 54
>
> #Note key difference:
> y*y #element by element multiplication
      [,1] [,2]
[1,] 1 9
[2,] 4 16
> y %**% y #matrix multiplication
      [,1] [,2]
[1,] 7 15
[2,] 10 22

```

Quitting S-Plus

Use function `q()` to quit S-Plus

```
> q()
```

Saving Your Work

Open a text editor window to save your commands and output. Cut and paste relevant code and output. If you are using emacs, just save the emacs file containing your S-Plus session.