A Brief R Introduction

1. Program Installation
http://www.r-project.org/

2. a good tutorial : An introduction to R
(How to get this? Google it or visit the R homepage .. manuals..; link from the course website)

3. Example

```
#set correct directory
setwd("D:/yufeng/elvis/teaching/STOR664/Program")

fiber <- read.table("fiber2.dat") ## read data
names(fiber) <- c("no","X1","X2","X3","X4")  ## name each column
attach(fiber)  ## the database “fiber” is attached to R search path so
               ## that one can approach the variable just by its name
X <- as.matrix(fiber)  ## store the database as matrix type
X <- X[,3:5]   ## take column 3-5
t(X)           ## transpose matrix
xtx = t(X)%*%X ## multiplication of matrices and assign the result on xtx
## print the object
solve(xtx)     ## inverse the matrix
?solve    ## get help page of the function (in this case, solve)
help(solve)

model <- lm(X1~X2+X4) ## fit linear model
summary(model)        ## show summary of the model
anova(model)          ## show the anova table
attributes(model)     ## see attributes of the object
plot(X1, model$residuals)   ## residual plot

### confidence interval for X1
xc <- t(matrix(ncol=4, nrow=3,
  c(75,70,45,
    80,70,45,
    80,75,42,
    65,80,40)))  ## get new data pts
xc<-data.frame(xc[,c(1,3)])   ## take column 1 and 3,
                                 ## store it as database type
xc
names(xc) <- c("X2","X4")     ## give names as same as original
                                 ## variables

p <- predict(model, xc,se.fit=T) ## prediction

## confidence interval, one can use the similar approach for
## construction of simultaneous CI and PI.
CI_each <- cbind(p$fit - qt(1-0.05/2,model$df.residual)*p$se.fit,
                 p$fit + qt(1-0.05/2,model$df.residual)*p$se.fit)

## more on drawing a graph
plot(X2, X1)
title("plot X2 vs X1")  ## put a title
abline(h=80)            ## put a horizontal line
abline(v=80)            ## put a vertical line
abline(a=10,b=1,lty=3)  ## put a line with intercept a, and slope b
lines(c(65,80),c(90,120)) ## put a line from (65,90) to (80, 120)
```