```r
# R Code for HW6                        Sta108, Fall 2007, Utts


### Problem 8.4
Data=read.table("~/Documents/School/Sta108utts/CH01PR27.txt")
names(Data)=c("Mass","Age")

#(a)
x1 = Data$Age - mean(Data$Age)
x1sq = x1^2
Data = cbind( Data, x1, x1sq)

#fit a quadratic model (8.2)
Quad = lm( Mass ~ x1 + x1sq, data=Data )
summary(Quad)

#plot fitted quadratic model
plot( Data$x1, Data$Mass, main="Polynomial Model", xlab="Age(centered)", ylab="Mass",
pch=19 )
#create (x,y) points for quadratic model
x = seq(-20, 20, by=.1)
y = 82.935749 - 1.183958*x + 0.014840*x^2
lines( x, y , col="blue")

#(b) #Test for regression relation.
#See F-statistic in summary().
summary(Quad)
qf(1-0.05, 2, 57)    #F-value  F(1-alpha, p-1, n-p)

#(e) #Test: Ho: Beta2 = 0, Ha: Beta2 not= 0.
#See t-statistic in summary().
qt(1-0.025, 57)    #t-value  t(1-alpha/2, n-p)

#(g)
cor(Data$Age, Data$Age^2)
cor(x1, x1sq)



### Problem 8.16
Data=read.table("~/Documents/School/Sta108utts/GPA.txt", header=TRUE)

#(b) #Fit model (8.33)
Fit = lm(GPA ~ ACT + Major, data=Data)
Fit

#(c) #Test: Ho: Beta2 = 0, Ha: Beta2 not= 0.
summary(Fit)
qt(1-0.01/2, 117)    #t-value  t(1-alpha/2, n-p)
```

```r
### Problem 8.18
#graph two response curves of model (8.49)
#see p.317 for the dataset, to get range of predictor X1
#now create (x,y) coordinates, and plot them as lines
#remember, x2 variable is an indicator: {0,1} variable
x1 = 30:310
y1 = 25 + .30*x1                    #Mutual firm  (8.50a)
y2 = 25 + .30*x1 - 12.5 + 0.05*x1   #Stock firm (8.50b)
plot(x1, y1, type="l", ylab="# months elapsed", xlab="Size of firm")
lines(x1, y2, col="red", lty=2, lwd=2)
#print legend:
legend("topleft", legend=c("Mutual firm","Stock firm"), col=c(1,2), lty=c(1,2),
lwd=c(1,2))


### Problem 8.20
#(a) #Fit model (8.49)
Fit = lm(GPA ~ ACT + Major + ACT*Major, data=Data)
Fit

#(b) #Test: Ho: Beta3 = 0, Ha: Beta3 not= 0.
summary(Fit)
qt(1-0.05/2, 117)    #t-value  t(1-alpha/2, n-p)
```