# R Code for HW3

# Problem 3.18

Data = read.table("CH03PR18.txt")
names(Data) = c("Y","X")

#(a)
plot(Data$X, Data$Y, main="Production Time", xlab="Production Lot Size", ylab="Production Time (Hours)", pch=19)

#(b)
#transform Data: X' = sqrt(X)
Data = cbind(Data, sqrtX=sqrt(Data$X))
#fit new model with X'
Fit = lm(Y~sqrtX, data=Data)
summary(Fit)

#(c)
#plot the estimated regression line
plot(Data$sqrtX, Data$Y, main="Transformed Plot of Production Time", xlab="Square-Root Production Lot Size", ylab="Production Time (Hours)", pch=19)
abline(Fit$coefficients[1], Fit$coefficients[2])

#(d)
#print residuals and fitted values to the screen
cbind(ei=Fit$residuals, Yhat=Fit$fitted.values)
#plot Residuals vs. Fitted Values
plot(Fit$fitted.values, Fit$residuals, main="Residuals vs. Fitted Values", xlab="Fitted Values", ylab="Residuals", pch=19)
abline(h=0)

#Normal Probability Plot
qqnorm(Fit$residuals, main="Normal Probability Plot")
qqline(Fit$residuals)

#Height-Weight Data

Data = read.table("wtheightm.txt", header=TRUE)

#fit the Full and Reduced regression models
Reduced = lm(Weight ~ Height, data=Data)
Full = lm(Weight ~ 0 + as.factor(Height), data = Data)
anova(Reduced, Full)