HW 4

#a

tt<- 1:100

z<- arima.sim(list(ar=c(.5)),n=100,sd=25)

x<-70+tt\*2+tt^2\*.03+z

#b

lm.x<-lm(x~tt+I(tt^2))

print(coefficients(lm.x))

coefficients of the fitted model

(Intercept) tt I(tt^2)

68.49712672 3.13922924 0.01697781

#c

confint(lm.x)

95% confidence intervals for parameters of quadratic model

tt: ( 2.407883270, 3.87057522)

I(tt^2): (0.009962291, 0.02399334)

These 95% confidence intervals do not include the true values for the parameters (2, .03)

#d

acf(lm.x$residuals)



This correlogram shows that there is autocorrelation with our quadratic model.

#e

library(nlme)

gls.x<-gls(x~tt+I(tt^2), correlation = corAR1(.5))

summary(gls.x)

Std.Error

(Intercept): 15.002632

tt: 0.686091

I(tt^2): 0.006571

The standard errors of parameter estimates of the GLS model are considerably larger than the standard errors of the quadratic model, and are more accurate because they take the autocorrelation into account.