MATH-650 Assignment 6

Saket Choudhary (USCID: 2170058637) ([skchoudh@usc.edu](mailto:skchoudh@usc.edu))

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# Problem 19

pH.data <- read.csv('case0702.csv', header=T)  
logT <- log(pH.data$Time)  
pH.data$logT <- logT  
n <- nrow(pH.data)

Simple linear regression model for is given by:

### Part (a)

fit <- lm(pH~logT, data=pH.data)  
s <- summary(fit)  
b0 <- fit$coefficients[1]  
b1 <- fit$coefficients[2]  
se0 <- s$coefficients[3]  
se1 <- s$coefficients[4]  
t0 <- s$coefficients[5]  
t1 <- s$coefficients[6]  
p0 <- s$coefficients[7]  
p1 <- s$coefficients[8]

Thus, and

### Part (b)

Xbar <- mean(log(pH.data$Time))#1.190  
sx2 <- var(log(pH.data$Time))#0.6344  
mu <- b0 +b1\*log(5)

Thus,

### Part (c)

sigmahat <- 0.08226  
se = sigmahat \*sqrt(1/n+(log(5)-Xbar)^2/(n-1\*sx2))

# Problem 25

### Part (a)

### Part (b)

And,

Thus,

Substituting (3) in (4), we get

Thus, (5) is same as (2)

Now, From (3)

Thus, (6) is same as (1)

Consider second order differentials:

Thus, the values of indeed guarantee a minima since the Hessian is positive definitee.

### Part (c)

# Problem 13

Intercept = 0.3991 Standard Error = 0.1185 df = 22

Upper limit = 0.3991 + 2.073 \* 0.1185 = 0.6447505 Lower limit = 0.3991 - 2.073 \* 0.1185 = 0.1534495

Thus, the 95% CI for Intercept is [0.1534495, 0.6447505]

Also following is the R code:

intercept <- 0.3991  
se <- 0.1185  
df <- 22  
t975 <- qt(0.975,df)  
limit.upper <- intercept + t975\*se  
limit.lower <- intercept - t975\*se  
limit.upper

## [1] 0.644854

limit.lower

## [1] 0.153346