> president <- c("Obama:2009-2007", "Bush:2001-2009", "Clinton:1993-2001", "Bush:1989-1993", "Reagan:1981-1989")

> president\_term <- strsplit(president, ":")

> president\_upper <- lapply(president\_term, toupper)

> class(president\_upper)

[1] "list"

> select\_first <- function(x) {

+ x[1]

+ }

> lapply(president\_upper, select\_first)

[[1]]

[1] "OBAMA"

[[2]]

[1] "BUSH"

[[3]]

[1] "CLINTON"

[[4]]

[1] "BUSH"

[[5]]

[1] "REAGAN"

> n <- nrow(mtcars)

> x <- mtcars$wt

> y <- mtcars$mpg

> beta.omitting.one = function(i, x, y) {

+ reg <- lm(y[-i]~x[-i])

+ return(reg$coefficient[2])

+ }

> beta.jack = sapply(1:n, FUN=beta.omitting.one, x=mtcars$wt, y=mtcars$mpg)

> sqrt((n-1)^2/n) \* sd(beta.jack)

[1] 0.7263368

> reg.full <- lm(y~x)

> summary(reg.full)

Call:

lm(formula = y ~ x)

Residuals:

Min 1Q Median 3Q Max

-4.5432 -2.3647 -0.1252 1.4096 6.8727

Coefficients:

Estimate Std. Error t value Pr(>|t|)

(Intercept) 37.2851 1.8776 19.858 < 2e-16 \*\*\*

x -5.3445 0.5591 -9.559 1.29e-10 \*\*\*

---

Signif. codes: 0 ‘\*\*\*’ 0.001 ‘\*\*’ 0.01 ‘\*’ 0.05 ‘.’ 0.1 ‘ ’ 1

Residual standard error: 3.046 on 30 degrees of freedom

Multiple R-squared: 0.7528, Adjusted R-squared: 0.7446

F-statistic: 91.38 on 1 and 30 DF, p-value: 1.294e-10

> bhat <- reg.full$coefficients[2]

> num <- sum(((x - mean(x))^2)\*(reg.full$residuals^2))/n

> den <- sum((x - mean(x))^2)/(n-1)

> sqrt(num)/sqrt(n)\*den

[1] 0.5626831

> B <- 999

> bstar <- c()

> for (b in 1:B) {

+ index <- sample(1:n, size=n, replace=TRUE)

+ xstar <- mtcars$wt[index]

+ ystar <- mtcars$mpg[index]

+ regstar <- lm(ystar~xstar)

+ bstar[b] <- regstar$coefficients[2]

+ }

> sd(bstar)

[1] 0.6886046