> library(boot)

> library(ISLR)

>

> set.seed(1)

>

> df <- Auto[, c(1, 4, 5)]

>

> X1 <- df[, 2]

> X2 <- df[, 3]

> y <- df[, 1]

>

> lm.fit <- lm(y ~ X1 + X2)

>

> beta0.hat <- lm.fit$coefficients[1]

> beta1.hat <- lm.fit$coefficients[2]

> beta2.hat <- lm.fit$coefficients[3]

>

> n <- nrow(df)

>

> beta1.star <- rep(NA, 1000)

> beta2.star <- rep(NA, 1000)

> t.star <- rep(NA, 1000)

>

> for (r in 1:1000) {

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

+ u.hat <- lm.fit$residuals[ind]

+ y.hat <- beta0.hat + beta1.hat \* X1 + beta2.hat \* X2 + u.hat

+ lm.fit.star <- lm(y.hat ~ X1 + X2)

+ beta1.star[r] <- lm.fit.star$coefficients[2]

+ t.star[r] <- (beta1.star[r] - beta1.hat) / summary(lm.fit.star)$coefficients[2,2]

+ }

>

> t.star <- sort(t.star)

> crit.t.star <- c(t.star[25], t.star[975])

>

>

> pdf(file="Homework 7.pdf")

> hist(t.star, breaks = 30, probability = TRUE, col= "grey",

+ main = "Distribution of t\* Under Residual Bootstrap")

> lines(density(t.star), col = "red", lwd = 3)

> abline(v = c(crit.t.star, beta1.hat), col = c("blue"), lty = c(2, 2, 1), lwd = 3)

> cat(paste("The 95% critical values are", round(crit.t.star[1], 3),

+ "and", round(crit.t.star[2], 3), "."))

The 95% critical values are -1.737 and 1.932 .> dev.off()

null device

1