R - Code for Brand Example - Hsu Procedure - Brand-Hsu.R in Canvas (by Jeffrey R. Fetzer)

```
mcb <- function(model, best = "smallest", alpha = .05)
    library(mvtnorm)
    if ("aov" %in% class(model) | "lm" %in% class(model)) {
        y <- model$model[,1]
        trt <- model$model[,2]
        dfMSE <- df.residual(model)
        MSE <- deviance(model)/dfMSE
    }
    data <- subset(data.frame(y, trt), is.na(y) == FALSE)
    means <- tapply(data[, 1], data[, 2], mean)
    ni <- tapply(data[, 1], data[, 2], length)
    N <- sum(ni)
    ntr <- length(ni)
    dcv <- qmvt(p=1-alpha, tail = "lower.tail", df = N-ntr, corr =
                matrix(rep(.5,(ntr-1)^2),ntr-1) + diag(ntr-1) * .5)$quantile
    if (best == "smallest") {
        min <- min(means)
        nmin <- min(means[means!=min(means)])
        m <- replace(rep(min, ntr), which(means==min, arr.ind=TRUE), nmin)
        k <- m + dcv*sqrt(MSE)*sqrt(2/ni[1])
        b <- (means < k)
        output <- data.frame(round(means, 3), round(m, 3), round(k, 3), b)
        names(output) <- c("means", "m", "k", "Best")
    }
    if (best == "largest") {
        max <- max(means)
        nmax <- max(means[means!=max(means)])
        m <- replace(rep(max, ntr), which(means==max, arr.ind=TRUE), nmax)
        k <- m - dcv*sqrt(MSE)*sqrt(2/ni[1])
        b <- (means > k)
        output <- data.frame(round(means, 3), round(m, 3), round(k, 3), b)
        names(output) <- c("means", "M", "k", "Best")
    }
    cat("Results for Hsu's procedure when 'best' is", best, "\n\n")
    print(output)
}
y = c(22, 20, 25, 17,26, 22, 27, 21,16, 20, 14, 18,
      20, 25, 26, 21,28, 29, 23, 24,22, 15, 19, 16 )
S1 = rep("S1",4), S2 = rep("S2",4), B1 = rep("B1",4), B2 = rep("B2",4), R1 = rep("R1",4), R2 = rep("R2",
TYPE = c(S1,S2,B1,B2,R1,R2)
BRAND = as.factor(TYPE)
Brandmodel = lm(y ~ BRAND)
mcb(Brandmodel)
Results for Hsu's procedure when 'best' is smallest

   means  m      k  Best
B1    17 18 23.112  TRUE
B2    23 17 22.112 FALSE
R1    26 17 22.112 FALSE
R2    18 17 22.112  TRUE
S1    21 17 22.112  TRUE
S2    24 17 22.112 FALSE
```