HW1.R

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# ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ #
# Dustin Pluta
# Assignment 1
# STAT 230: Winter 2017
# ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ #

setwd("~/Dropbox/Coursework/Winter2017/STAT230")
dat1 <- read.csv("Data/Assignment1.csv", row.names = 1)

X <- as.matrix(dat1[, 1:5])
y <- as.matrix(dat1$y)

# ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ #
## PROBLEM 1 ####
# ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ #

# (a) Gram-Schmidt
source("Code/gram_schmidt.R")
QR <- gram_schmidt(X)
beta <- solve(QR$R) %*% t(QR$Q) %*% y

# (b) Householder
source("Code/householder.R")
QR <- householder(X)
beta <- solve(QR$R) %*% t(QR$Q) %*% y

# (c) Jacobi
source("Code/jacobi.R")
beta <- jacobi(t(X) %*% X, rep(1, 5), t(X) %*% y)

# Verify values using lm()
fit <- lm(y ~ . - 1, data = dat1)
fit$coefficients
```

```
##         X1         X2         X3         X4         X5
## -1.9491741 -1.0132595 -0.0397409  0.9353750  2.0160657
```

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# ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ #
## PROBLEM 2 ####
# ~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~~ #

# Set BATCH 1 data and compute coefficient
# estimates for using the jacobi method.
X_n <- X[1:80, ]
y_n <- y[1:80]
beta_batch1 <- jacobi(t(X_n) %*% X_n,
               rep(1, 5), t(X_n) %*% y_n)
```

```r
# Set BATCH 2 data and update coefficient
# estimates from BATCH 1
# using formula from Lecture 3.
X_k <- X[81:100, ]
y_k <- y[81:100]
A <- t(X) %*% X
b <- A %*% beta_batch1 + t(X_k) %*% (y_k - X_k %*% beta_batch1)
beta <- jacobi(A, beta_batch1, b)
```