Workshop 5 Solution

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#### 1. Loop practice

**(a)** Write a function called calculateRowMeans that uses a **for loop** to calculate the row means of a matrix x.

# calculateRowMeans computes the row means of a matrix x  
# input: matrix x  
# output: vector of length nrow(x) giving row means of x  
calculateRowMeans <- function(x) {  
 row.means <- numeric(nrow(x))  
 for(i in 1:nrow(x)) {  
 row.means[i] <- mean(x[i,])  
 }  
 row.means  
}

**(b)** Try out your function on the random matrix fake.data defined below.

set.seed(12345) # Set seed of random number generator  
fake.data <- matrix(rnorm(500), ncol=5)  
calculateRowMeans(fake.data)

## [1] 0.104711160 -0.212815850 0.080097701 -0.104435950 0.168726034  
## [6] -0.276477625 -0.062646728 0.366882193 -0.433799415 -0.004952225  
## [11] -0.448751356 -0.122943620 0.775054241 1.140645559 -0.032540068  
## [16] 0.058354128 -0.105059472 -0.752380885 0.460506777 0.122805690  
## [21] 0.817373014 0.277099615 -0.003069567 0.078224338 -0.237097230  
## [26] 0.364344827 -0.145794603 0.283380408 0.105536231 0.062912786  
## [31] 0.626789243 0.547661893 0.652108071 0.069632813 0.918556841  
## [36] -0.033380220 0.028618498 0.161430138 0.764679323 0.449573986  
## [41] 0.351826141 -0.783320802 -0.172279252 -0.016911857 0.376613887  
## [46] 0.626161998 -0.461096173 -0.063753735 -0.024108330 -0.133152285  
## [51] -0.392474023 0.887754214 -0.266413458 -0.681254718 0.203629848  
## [56] 0.302400050 0.764454675 -0.021683984 0.191472161 -0.944533784  
## [61] -0.257833724 -0.371427022 0.122738610 -0.095647016 -0.039965777  
## [66] -0.496087157 0.173478440 0.318222961 -0.060915512 -0.480218084  
## [71] 0.154699485 0.306528684 -0.440338582 0.433748573 0.291561192  
## [76] 0.258839366 0.777379894 -0.639731351 0.099893526 0.368316779  
## [81] -0.456305624 0.185681802 -0.268762250 1.023826194 0.306709808  
## [86] 0.472252016 0.776952506 0.354263312 0.060452361 0.177687987  
## [91] -0.242639463 -0.144272519 0.472164602 -0.414840660 -0.122722673  
## [96] 0.431275348 -0.380115931 0.110312883 -0.391319986 -0.380656883

**(b)** Use the apply() function to calculate the row means of the matrix fake.data

apply(fake.data, MARGIN=1, FUN=mean)

## [1] 0.104711160 -0.212815850 0.080097701 -0.104435950 0.168726034  
## [6] -0.276477625 -0.062646728 0.366882193 -0.433799415 -0.004952225  
## [11] -0.448751356 -0.122943620 0.775054241 1.140645559 -0.032540068  
## [16] 0.058354128 -0.105059472 -0.752380885 0.460506777 0.122805690  
## [21] 0.817373014 0.277099615 -0.003069567 0.078224338 -0.237097230  
## [26] 0.364344827 -0.145794603 0.283380408 0.105536231 0.062912786  
## [31] 0.626789243 0.547661893 0.652108071 0.069632813 0.918556841  
## [36] -0.033380220 0.028618498 0.161430138 0.764679323 0.449573986  
## [41] 0.351826141 -0.783320802 -0.172279252 -0.016911857 0.376613887  
## [46] 0.626161998 -0.461096173 -0.063753735 -0.024108330 -0.133152285  
## [51] -0.392474023 0.887754214 -0.266413458 -0.681254718 0.203629848  
## [56] 0.302400050 0.764454675 -0.021683984 0.191472161 -0.944533784  
## [61] -0.257833724 -0.371427022 0.122738610 -0.095647016 -0.039965777  
## [66] -0.496087157 0.173478440 0.318222961 -0.060915512 -0.480218084  
## [71] 0.154699485 0.306528684 -0.440338582 0.433748573 0.291561192  
## [76] 0.258839366 0.777379894 -0.639731351 0.099893526 0.368316779  
## [81] -0.456305624 0.185681802 -0.268762250 1.023826194 0.306709808  
## [86] 0.472252016 0.776952506 0.354263312 0.060452361 0.177687987  
## [91] -0.242639463 -0.144272519 0.472164602 -0.414840660 -0.122722673  
## [96] 0.431275348 -0.380115931 0.110312883 -0.391319986 -0.380656883

**(c)** Compare this to the output of the rowMeans() function to check that your calculation is correct.

identical(calculateRowMeans(fake.data), apply(fake.data, MARGIN=1, FUN=mean))

## [1] TRUE