

# Homework #3

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## Question 1

```
set.seed(12) # to be reproducible

## Creates a 50 x 10 matrix with the values 1-500
A = matrix(data = runif(n = 1:500), nrow = 50, ncol = 10)

## Adds column names with lake and a number separated with a "_"
colnames(A) = paste("lake", 1:10, sep = "_")

#####
## Calculating Average using for loop
#####

## Creates a matrix to record means in
AloopMeans = matrix(data = 0, nrow = 1, ncol = 10)

## Adds column names with lake and a number separated with a "_"
colnames(AloopMeans) = paste("lake", 1:10, sep = "_")

## for loop to run through each column and calculate the mean.
for(i in 1:ncol(A)){

  ##
  AloopMeans[i] = sum(A[,i])/NROW(A[,i])
}

## Print means generated using the for loop
print(AloopMeans)

##          lake_1    lake_2    lake_3    lake_4    lake_5    lake_6    lake_7
## [1,] 0.4601492 0.4992815 0.5987037 0.4580486 0.4719578 0.4965216 0.5110536
##          lake_8    lake_9    lake_10
## [1,] 0.4577936 0.5193423 0.4856413
```

```
#####
## Using colMeans
#####

## Records Average from colMeans
AcolMeans = colMeans(A)

## Prints Averages from colMeans
print(AcolMeans)

##      lake_1      lake_2      lake_3      lake_4      lake_5      lake_6      lake_7      lake_8
## 0.4601492 0.4992815 0.5987037 0.4580486 0.4719578 0.4965216 0.5110536 0.4577936
##      lake_9      lake_10
## 0.5193423 0.4856413
```

## Question 2

```
## Creates a 3x3x3 array with the values 1 to 27
x = array(1:27, dim = c(3, 3, 3))

## Empty 3x3 array used to record the list of numbers
x.ap = array(dim = c(3,3))

## For loop to run through the first dimension of x
for(i in 1:dim(x)[1]){

  ## For loop for the second dimension of x
  for(q in 1:dim(x)[2]){

    ## Resets values in x.char
    x.char = NULL

    ## For loop for the third dimension of x
    for(u in 1:dim(x)[3]){

      ## Records the numbers at position i,q as three characters
      x.char = cbind(x.char, as.character(x[i,q,u]))
    }

    ## Combines the list of numbers generated in the for loop above into one string seperated by a comma
    x.ap.list = paste(unlist(x.char), collapse = ", ")

    ## Record string of numbers into array
    x.ap[i,q] <- x.ap.list
  }
}

## Prints array
print(x.ap)

##      [,1]      [,2]      [,3]
```

```
## [1,] "1, 10, 19" "4, 13, 22" "7, 16, 25"
## [2,] "2, 11, 20" "5, 14, 23" "8, 17, 26"
## [3,] "3, 12, 21" "6, 15, 24" "9, 18, 27"
```

### Question 3

```
## How many numbers of the Fibonacci Sequence you want to generate.
fib.length = 30

## Makes a list of 30 elements all set to 0.
Fib.seq = matrix(0, ncol = 1, nrow=fib.length)

## Sets the second term of the matrix to 1.
Fib.seq[2] = 1

## For loop to calculate sum of previous two values.
for (i in 3:fib.length){
  Fib.seq[i] = Fib.seq[i-1] + Fib.seq[i-2]
} # Closes for loop

## Prints out the first 30 terms of the Fibonacci Sequence.
print(Fib.seq)
```

```
##           [,1]
## [1,]      0
## [2,]      1
## [3,]      1
## [4,]      2
## [5,]      3
## [6,]      5
## [7,]      8
## [8,]     13
## [9,]     21
## [10,]    34
## [11,]    55
## [12,]    89
## [13,]   144
## [14,]   233
## [15,]   377
## [16,]   610
## [17,]   987
## [18,]  1597
## [19,]  2584
## [20,]  4181
## [21,]  6765
## [22,] 10946
## [23,] 17711
## [24,] 28657
## [25,] 46368
## [26,] 75025
```

```
## [27,] 121393
## [28,] 196418
## [29,] 317811
## [30,] 514229
```

## Question 4

```
## Lists the top 105 songs from the radio station KITS San Francisco on Jan 1, 1992.
top105 = readLines("http://www.textfiles.com/music/ktop100.txt")

## Removes missing no. 54 and 55
top105 = top105[-c(64, 65)]

y = grep("[0-9]+([.][0-9])?", top105, value = T)

z = gsub(".*$", "", y)

print(z)
```

```
## [1] "1." "2." "3." "4." "5." "6." "7." "8." "9."
## [10] "10." "11." "12." "13." "14." "15." "16." "17." "18."
## [19] "19." "20." "21." "22." "23." "24." "25." "26." "27."
## [28] "28." "29." "30." "31." "32." "33." "34." "35." "36."
## [37] "37." "38." "39." "40." "41." "42." "43." "44." "45."
## [46] "46." "47." "48." "49." "50." "51." "52." "53." "56."
## [55] "57." "58." "59." "60." "61." "62." "63." "64." "65."
## [64] "66." "67." "68." "69." "70." "71." "72." "73." "74."
## [73] "75." "76." "77." "78." "79." "80." "81." "82." "83."
## [82] "83." "84." "85." "86." "87." "88." "89." "90." "91."
## [91] "91." "92." "93." "94." "95." "96." "97." "97." "98."
## [100] "99." "100." "101." "102." "103." "104." "105." "105.3"
```

## Question 5

```
## Removes the period from each number
A = sub("\\D", "", z)

## Converts the strings to numbers
A = as.numeric(A)

## creates a list that defines any repeated value as True
dup.data = duplicated(A)

## How many ties are present:
print(sum(dup.data))
```

```
## [1] 3
```

```
## for loop to test for repeats and print out what position the tie occurred at.
for(i in 1:length(dup.data)){

  ## Tests for any repeated values
  if(dup.data[i] == TRUE)
    print(A[i]) # Print out repeated positions
} # Closes for loop
```

```
## [1] 83
## [1] 91
## [1] 97
```

,