**Assignment 1.5**

1. Create an m x n matrix with replicate(m, rnorm(n)) with m=10 column vectors of n=10 elements each,

constructed with rnorm(n), which creates random normal numbers.

Then we transform it into a dataframe (thus 10 observations of 10 variables) and perform an algebraic

operation on each element using a nested for loop: at each iteration, every element referred by the two

indexes is incremented by a sinusoidal function, compare the vectorized and non-vectorized form of creating the solution and report the system time differences.

**Answer**

**Non vectorized version**

> m=10; n=10;

> mymat<-replicate(m, rnorm(n)) # create matrix of normal random numbers

> mydframe=data.frame(mymat)

> View(mydframe)

> View(mydframe)

> m=10; n=10;

> mymat<-replicate(m, rnorm(n)) # create matrix of normal random numbers

> df=data.frame(mymat)

> View(df)

> system.time(for (i in 1:m) {

+ for (j in 1:n) {

+ df[i,j]<-df[i,j] + 10\*sin(0.75\*pi)

+ }

+ }

+ )

user system elapsed

0 0 0

**Vectorized version**

m=10; n=10;

> mymat<-replicate(m, rnorm(n))

> df1=data.frame(mymat)

> system.time(df1<-df + 10\*sin(0.75\*pi))

user system elapsed

0 0 0

> df1

X1 X2 X3 X4 X5 X6 X7 X8 X9 X10

1 15.07712 13.69360 14.12049 14.62358 14.33431 14.51986 14.96269 15.39364 14.78544 13.65397

2 14.09625 14.99772 14.07711 12.07088 12.81954 14.11600 13.68045 15.12006 13.94545 15.40557

3 14.20330 14.51498 14.31549 14.07450 11.84492 14.55648 12.58421 13.75877 14.25404 15.08563

4 14.35129 12.91538 16.02846 15.43766 14.73763 14.67142 13.96190 13.72245 11.95985 14.61108

5 14.47266 12.95013 14.72369 15.70471 12.13590 14.42254 12.23406 13.37327 14.62014 13.08153

6 13.48415 14.32654 13.63862 13.92509 13.80787 16.11217 14.02358 14.58347 15.23654 15.02212

7 14.17872 13.22458 14.84802 14.02960 14.01279 14.18751 15.12425 13.64911 14.42199 13.96763

8 12.60468 14.98954 13.67454 15.15688 12.51636 12.51562 15.70255 14.67123 14.90274 15.21736

9 14.95971 12.40784 14.77230 13.41708 16.92177 13.85039 14.80435 15.00749 14.96262 13.86192

10 14.24103 15.21597 15.49869 14.81103 14.22859 14.90880 15.35809 14.99542 14.50284 14.18452