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.

ANS.

**mat\_A <- replicate(10,rnorm(10))**

**df\_A <- as.data.frame(mat\_A)**

**system.time({for(i in 1:10){**

**for(j in 1:10){**

**df\_A[i,j]=df\_A[i,j]\*10**

**}**

**}**

**})**

**vec\_A <- unmatrix(df\_A,byrow = T)**

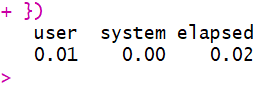
**system.time({for(i in 1:100){**

**vec\_A[i]=vec\_A[i]\*10**

**}**

**})**

**OUTPUT:**

****