**SESSION 2-ASSIGNMENT3**

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.

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| > m=10; n=10;  > mymat<-replicate(m, rnorm(n))  > mymat  [,1] [,2] [,3] [,4] [,5] [,6]  [1,] -2.4088791 -0.44071425 -1.07233442 0.5211470 -0.0409870933 -1.61160278  [2,] 0.6340336 0.02345993 0.85885926 -0.4694658 0.5798842706 -1.68510783  [3,] -0.1962969 -0.42976521 -0.25932380 0.2985308 -0.5488459657 -1.12711291  [4,] 1.0882275 0.90229712 -0.03069584 -0.3658142 -0.2664969488 -0.49589799  [5,] -2.2287262 -0.64996070 0.95168946 0.8398277 -0.7111487391 1.31328170  [6,] 0.2007554 1.71640361 -1.12470530 0.7500406 0.1429519366 1.75697671  [7,] 2.6861883 0.56551421 -0.08619449 1.5925928 0.5354001686 -0.05722555  [8,] -0.2006217 0.24509474 -0.04851917 1.8669149 -0.2351173837 -1.27274488  [9,] -0.3757338 0.05488077 -1.57038515 -0.6896847 -1.3562715260 1.51403569  [10,] 1.0644910 -0.06000146 -0.58158356 -0.6711796 0.0001099885 -0.39287177  [,7] [,8] [,9] [,10]  [1,] 0.01244069 0.817616791 -1.10637220 -0.10760240  [2,] -2.41996499 -2.215388008 0.38211004 -1.54468025  [3,] 0.12610452 1.008594070 0.76054576 0.89781815  [4,] -1.44496642 0.118982910 -0.34087334 -0.16952905  [5,] -0.12811086 0.187295958 1.42275046 0.10942424  [6,] -0.78468710 0.067569952 -1.98336270 -0.39881958  [7,] 1.57619794 0.004040216 -0.07389119 -0.05899064  [8,] 0.01805978 -0.179630872 -0.42771706 -1.02096333  [9,] -0.02919124 0.936009076 -0.59587184 0.14469352  [10,] -0.55044980 0.238662182 0.13573036 1.35488795  > mydframe=data.frame(mymat)  > mydframe  X1 X2 X3 X4 X5 X6 X7  1 -2.4088791 -0.44071425 -1.07233442 0.5211470 -0.0409870933 -1.61160278 0.01244069  2 0.6340336 0.02345993 0.85885926 -0.4694658 0.5798842706 -1.68510783 -2.41996499  3 -0.1962969 -0.42976521 -0.25932380 0.2985308 -0.5488459657 -1.12711291 0.12610452  4 1.0882275 0.90229712 -0.03069584 -0.3658142 -0.2664969488 -0.49589799 -1.44496642  5 -2.2287262 -0.64996070 0.95168946 0.8398277 -0.7111487391 1.31328170 -0.12811086  6 0.2007554 1.71640361 -1.12470530 0.7500406 0.1429519366 1.75697671 -0.78468710  7 2.6861883 0.56551421 -0.08619449 1.5925928 0.5354001686 -0.05722555 1.57619794  8 -0.2006217 0.24509474 -0.04851917 1.8669149 -0.2351173837 -1.27274488 0.01805978  9 -0.3757338 0.05488077 -1.57038515 -0.6896847 -1.3562715260 1.51403569 -0.02919124  10 1.0644910 -0.06000146 -0.58158356 -0.6711796 0.0001099885 -0.39287177 -0.55044980  X8 X9 X10  1 0.817616791 -1.10637220 -0.10760240  2 -2.215388008 0.38211004 -1.54468025  3 1.008594070 0.76054576 0.89781815  4 0.118982910 -0.34087334 -0.16952905  5 0.187295958 1.42275046 0.10942424  6 0.067569952 -1.98336270 -0.39881958  7 0.004040216 -0.07389119 -0.05899064  8 -0.179630872 -0.42771706 -1.02096333  9 0.936009076 -0.59587184 0.14469352  10 0.238662182 0.13573036 1.35488795  > system.time(for (i in 1:m) {  + for (j in 1:n) {  + mydframe[i,j]<-mydframe[i,j] + 10\*sin(0.75\*pi)  + }  + }  + )  user system elapsed  0.02 0.00 0.02  > mydframe  X1 X2 X3 X4 X5 X6 X7 X8 X9  1 4.662189 6.630354 5.998733 7.592215 7.030081 5.459465 7.083509 7.888685 5.964696  2 7.705101 7.094528 7.929927 6.601602 7.650952 5.385960 4.651103 4.855680 7.453178  3 6.874771 6.641303 6.811744 7.369599 6.522222 5.943955 7.197172 8.079662 7.831614  4 8.159295 7.973365 7.040372 6.705254 6.804571 6.575170 5.626101 7.190051 6.730194  5 4.842342 6.421107 8.022757 7.910896 6.359919 8.384350 6.942957 7.258364 8.493818  6 7.271823 8.787471 5.946363 7.821108 7.214020 8.828045 6.286381 7.138638 5.087705  7 9.757256 7.636582 6.984873 8.663661 7.606468 7.013842 8.647266 7.075108 6.997177  8 6.870446 7.316163 7.022549 8.937983 6.835950 5.798323 7.089128 6.891437 6.643351  9 6.695334 7.125949 5.500683 6.381383 5.714796 8.585104 7.041877 8.007077 6.475196  10 8.135559 7.011066 6.489484 6.399888 7.071178 6.678196 6.520618 7.309730 7.206798  X10  1 6.963465  2 5.526388  3 7.968886  4 6.901539  5 7.180492  6 6.672248  7 7.012077  8 6.050104  9 7.215761  10 8.425956  > m=10; n=10;  > mymat<-replicate(m, rnorm(n))  > mydframe=data.frame(mymat)  > system.time(mydframe<-mydframe + 10\*sin(0.75\*pi))  user system elapsed  0 0 0  > mydframe  X1 X2 X3 X4 X5 X6 X7 X8 X9  1 8.354322 7.977125 6.530301 9.245329 6.553942 7.008276 8.337631 7.335902 7.745925  2 6.589633 7.784327 7.371038 7.725134 7.715461 6.804764 7.658853 7.017349 8.176767  3 7.816434 6.265050 4.935287 6.747625 6.753333 5.777285 7.651473 6.551844 7.024120  4 6.496557 5.041552 6.617863 6.103069 5.904365 5.627377 7.519596 6.276903 7.621280  5 6.154575 6.501881 8.050186 8.670747 6.822241 7.798837 6.276296 6.966302 7.915381  6 6.211150 8.517319 7.344370 6.586595 5.902001 8.171147 7.545244 7.320612 8.483483  7 6.730203 6.602296 7.085016 5.365271 7.572473 8.104466 6.446773 8.818297 6.959905  8 6.113413 7.811257 6.997667 7.945868 8.770371 7.281440 6.255896 5.297917 7.127421  9 8.095025 7.389780 5.661086 5.605924 5.118996 6.915879 5.166335 7.509782 7.156830  10 6.096084 6.625044 6.951197 7.119415 6.857019 8.936986 7.431478 5.042180 7.193373  X10  1 7.813815  2 6.680782  3 6.735117  4 7.361965  5 6.813916  6 6.731545  7 6.925519  8 6.970783  9 6.805302  10 5.246036 |
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