```
> #question1
> vector1 <- c(1,2,3,4)
> vector2 <- c('a','b','c','d')
> vector3 <- c(FALSE, FALSE, TRUE, TRUE)
> length(vector3)
[1] 4
> vector1[1]
[1] 1
> vector1[3]
[1] 3
> vector1[4]
[1] 4
> #question2
> rowname <- paste("R", 1:2, sep = "")
> columnname <- paste("C", 1:5, sep = "")
> a = matrix(1:10, nrow = 2, ncol = 5, byrow=FALSE, dimnames = list
(rowname, columnname))
> a
   C1 C2 C3 C4 C5
R1  1  3  5  7  9
R2  2  4  6  8 10
> a[6]
[1] 6
> a[2,5]
[1] 10
> a[1,]
C1 C2 C3 C4 C5
 1  3  5  7  9
> a[,2]
R1 R2
 3  4
> #question3
> dim1 <- c(1,2,3)
> dim2 <- c(4,5,6)
> dim3 <- c(7,8,9)
> dim4 <- c(10,11,12)
> z = array(1:81, c(3,3,3,3), dimnames = list(dim1, dim2, dim3,dim
4))
> z
, , 7, 10

  4 5 6
1 1 4 7
2 2 5 8
3 3 6 9

, , 8, 10

   4  5  6
1 10 13 16
2 11 14 17
3 12 15 18

, , 9, 10

   4  5  6
1 19 22 25
2 20 23 26
3 21 24 27

, , 7, 11
```

```
    4  5  6
1 28 31 34
2 29 32 35
3 30 33 36

, , 8, 11

    4  5  6
1 37 40 43
2 38 41 44
3 39 42 45

, , 9, 11

    4  5  6
1 46 49 52
2 47 50 53
3 48 51 54

, , 7, 12

    4  5  6
1 55 58 61
2 56 59 62
3 57 60 63

, , 8, 12

    4  5  6
1 64 67 70
2 65 68 71
3 66 69 72

, , 9, 12

    4  5  6
1 73 76 79
2 74 77 80
3 75 78 81

> refer <- z[81]
> refer
[1] 81
> #question4
> names <- c("niko","jack","tommy","franklin","trevor","name6","name
7","name8","name9","name10","name11","name12","name13","name14","nam
e15")
> birthday <- c("1950-1-1", "1960-1-1", "1970-1-1", "1980-1-1", "199
0-1-1","1990-1-2","1990-1-3","1990-1-4","1990-1-5","1990-1-6","1990-
1-7","1990-1-8","1990-1-9","1990-1-10","1990-1-11")
> transformedbirthday <- as.Date(birthday, "%Y-%m-%d")
> gender <- c( "male","male","female","female","female","female","fe
male","female","female", "male", "male","female","female","female",
"male")
> age <- c(69,59,49,39,29,29,29,29,29,29,29,29,29,29,29)
> salary <- c(100, 110, 120, 130, 140, 140, 140, 140, 140, 140, 140,
 140, 140, 140, 140)
> mydataframe <- data.frame(names, birthday, gender,age,salary)
> mydataframe
      names  birthday gender age salary
1      niko 1950-1-1   male  69    100
2      jack 1960-1-1   male  59    110
```

```
3       tommy  1970-1-1 female  49     120
4    franklin  1980-1-1 female  39     130
5      trevor  1990-1-1 female  29     140
6       name6  1990-1-2 female  29     140
7       name7  1990-1-3 female  29     140
8       name8  1990-1-4 female  29     140
9       name9  1990-1-5 female  29     140
10     name10  1990-1-6   male  29     140
11     name11  1990-1-7   male  29     140
12     name12  1990-1-8 female  29     140
13     name13  1990-1-9 female  29     140
14     name14 1990-1-10 female  29     140
15     name15 1990-1-11   male  29     140
> summary(mydataframe)
      names          birthday     gender        age
 franklin:1    1950-1-1 :1    female:10    Min.    :29.00
 jack    :1    1960-1-1 :1    male  : 5    1st Qu.:29.00
 name10  :1    1970-1-1 :1                 Median :29.00
 name11  :1    1980-1-1 :1                 Mean    :35.67
 name12  :1    1990-1-1 :1                 3rd Qu.:34.00
 name13  :1    1990-1-10:1                 Max.    :69.00
 (Other) :9    (Other)  :9
     salary
 Min.    :100.0
 1st Qu.:135.0
 Median :140.0
 Mean    :133.3
 3rd Qu.:140.0
 Max.    :140.0

> subset <- mydataframe$names[age < 50 & age > 30 & gender == 'male
']
> subset
factor(0)
15 Levels: franklin jack name10 name11 ... trevor
> #question5
> newlist <- c('a', '12','$10000','c','d')
> newlist1 <-newlist
> names(newlist)[2] <- c("age")
> names(newlist)[3] <- c("salary")
> newlist
    <NA>        age    salary     <NA>       <NA>
     "a"       "12" "$10000"        "c"        "d"
> newlist[5]
<NA>
 "d"
 > #question6
 > list <- c("A","B","C","D","E")
 > withorder <- factor(list, ordered = TRUE, levels = c("A",
"B","C","D","E"))
 > withoutorder <- list
 > withorder
 [1] A B C D E
 Levels: A < B < C < D < E
 > withoutorder
 [1] "A" "B" "C" "D" "E"
 > #question7
 > dataset1 = runif(100,0,100)
 > dataset2 = runif(100,0,100)
 > dataset1
  [1]  3.113203 97.370735 73.852585 67.902602 14.957955
  [6] 81.839516 13.159427 41.763538 11.742700 54.540918
 [11] 23.963302 26.262048  6.309152 60.442930 51.428689
```

```
[16] 58.542536 86.850485 61.326049  4.566649 21.530315
[21] 89.620530 79.731048 52.451072 66.306604 99.120007
[26] 21.366614 55.597350  7.974469 81.693175 90.184777
[31]  9.922863 23.649503 96.186325 51.548256 91.102128
[36] 75.572414  8.760366 35.538398 77.968272 84.945100
[41] 95.828513 20.910440 39.184858 72.040913 10.879853
[46] 84.334149 85.199690 52.664248 31.878643 81.689608
[51] 29.043636  2.897456 38.256571 79.704226 93.026458
[56] 41.341139 13.650072  7.853900 83.900095  9.343235
[61]  7.045734 87.085376 87.657231 18.514793 67.205096
[66] 14.021445 64.690441 35.282433 48.328488 16.418847
[71] 13.367694 98.798426 47.615515 88.644115 88.905471
[76] 20.867839 47.002561 12.460090 10.088017 27.646744
[81] 97.164775  4.360018 76.435551 49.788576  2.960065
[86] 51.775194 96.166375 23.695505 48.649599 13.079607
[91] 72.832076 89.792138  1.609462  2.489711 67.523535
[96] 90.078780 84.604120 29.375895 17.095279 81.279844

> 
> dataset2
  [1] 83.2335413 76.0157041 92.0504558 46.0443115
  [5] 73.2142546 42.2666930 91.0896326 98.3846681
  [9] 44.0645506 36.5994010 99.1695193 89.6372163
 [13] 32.0050443 33.7889598  3.9387886 23.0964500
 [17] 82.1762305 64.4138742 98.9131168 27.2276849
 [21] 56.6041227 92.7132541 34.5027244  9.0603064
 [25] 98.0403299 85.4481686 41.4598950 50.1216477
 [29]  3.6204636 64.9342423 29.1979063 28.9163512
 [33] 91.9324181 81.5857985 45.8484394 10.9015349
 [37] 59.0110735 84.0294679  0.3934501 41.1090784
 [41]  4.8782783 76.7795231  0.9104301 37.5973559
 [45] 86.9792460 17.2061404 15.7674759 29.9653924
 [49]  9.7390819 83.3496491 45.5442949 72.8438917
 [53] 86.3746140 67.6988831 63.3893233 92.6505049
 [57] 52.3614450 43.3273297 55.2820652 31.8051987
 [61] 99.2685573  0.5260786 77.3094236  0.4743890
 [65] 28.6568117 56.7077553 53.3351998 95.0384760
 [69] 71.4189183 42.7933221 66.8762994 93.6021950
 [73]  8.3780474 96.8559938 90.7318611 81.9178605
 [77]  5.1655222  8.1673605 69.0357938 96.0615792
 [81] 87.8186490 89.0823249 41.4132065 38.4746168
 [85]  6.2767267 54.3072239 52.5576007 13.5541570
 [89] 30.5513826 24.8088397 35.7508301 66.0243233
 [93] 94.2730706 84.0733137 50.9618907 94.6971372
 [97] 48.6277300 24.5670273 18.8416514 43.7423320
> mean(dataset1)
[1] 49.36735
> var(dataset1)
[1] 1041.789
> sd(dataset1)
[1] 32.27676
> mean(dataset2)
[1] 53.63936
> var(dataset2)
[1] 958.6351
> sd(dataset2)
[1] 30.96183
> range1 <- quantile(dataset1, c(0.75))-quantile(dataset1,c
(0.25))
> range2 <- quantile(dataset2, c(0.75))-quantile(dataset2,c
(0.25))
> range1
     75%
64.76433
> range2
     75%
53.74608
> cov(dataset1,dataset2)
```

```
[1] -22.74065
> cor(dataset1, dataset2)
[1] -0.0227555

> question8
 > set.seed(1)
 > x <- seq(1,10000,length.out = 10000)
 > y1 <- dt(x, 3, 0)
 > y1
   [1] 2.067483e-01 6.750966e-02 2.297204e-02
   [4] 9.163361e-03 4.219354e-03 2.174867e-03
   [7] 1.223363e-03 7.369065e-04 4.688171e-04
  [10] 3.118082e-04 2.151387e-04 1.530831e-04
  [13] 1.118163e-04 8.353257e-05 6.363445e-05
  [16] 4.931312e-05 3.879684e-05 3.093617e-05
  [19] 2.496659e-05 2.036817e-05 1.678016e-05
  [22] 1.394775e-05 1.168796e-05 9.867449e-06
  [25] 8.387697e-06 7.175009e-06 6.173619e-06
  [28] 5.340877e-06 4.643839e-06 4.056827e-06
  [31] 3.559655e-06 3.136325e-06 2.774066e-06
  [34] 2.462607e-06 2.193640e-06 1.960396e-06
  [37] 1.757332e-06 1.579883e-06 1.424269e-06
  [40] 1.287345e-06 1.166481e-06 1.059471e-06
  [43] 9.644507e-07 8.798454e-07 8.043149e-07
  [46] 7.367160e-07 6.760701e-07 6.215368e-07
  [49] 5.723914e-07 5.280078e-07 4.878430e-07
  [52] 4.514249e-07 4.183419e-07 3.882342e-07
  [55] 3.607865e-07 3.357217e-07 3.127958e-07
  [58] 2.917936e-07 2.725246e-07 2.548200e-07
  [61] 2.385298e-07 2.235206e-07 2.096735e-07
  [64] 1.968821e-07 1.850513e-07 1.740958e-07
  [67] 1.639391e-07 1.545123e-07 1.457533e-07
  [70] 1.376063e-07 1.300205e-07 1.229503e-07
  [73] 1.163541e-07 1.101944e-07 1.044369e-07
  [76] 9.905049e-08 9.400690e-08 8.928025e-08
  [79] 8.484695e-08 8.068541e-08 7.677589e-08
  [82] 7.310030e-08 6.964204e-08 6.638587e-08
  [85] 6.331779e-08 6.042490e-08 5.769535e-08
  [88] 5.511818e-08 5.268331e-08 5.038141e-08
  [91] 4.820386e-08 4.614269e-08 4.419051e-08
  [94] 4.234048e-08 4.058625e-08 3.892193e-08
  [97] 3.734205e-08 3.584152e-08 3.441560e-08
 [100] 3.305989e-08 3.177028e-08 3.054294e-08
 [103] 2.937430e-08 2.826102e-08 2.719997e-08
 [106] 2.618826e-08 2.522315e-08 2.430209e-08
 [109] 2.342269e-08 2.258270e-08 2.178004e-08
 [112] 2.101272e-08 2.027889e-08 1.957682e-08
 [115] 1.890487e-08 1.826150e-08 1.764527e-08
 [118] 1.705481e-08 1.648884e-08 1.594616e-08
 [121] 1.542562e-08 1.492614e-08 1.444672e-08
 [124] 1.398640e-08 1.354426e-08 1.311945e-08
 [127] 1.271117e-08 1.231865e-08 1.194116e-08
 [130] 1.157802e-08 1.122858e-08 1.089223e-08
 [133] 1.056837e-08 1.025647e-08 9.955979e-09
 [136] 9.666416e-09 9.387305e-09 9.118194e-09
 [139] 8.858658e-09 8.608291e-09 8.366706e-09
 [142] 8.133536e-09 7.908433e-09 7.691063e-09
 [145] 7.481110e-09 7.278273e-09 7.082264e-09
 [148] 6.892808e-09 6.709645e-09 6.532526e-09
 [151] 6.361213e-09 6.195479e-09 6.035107e-09
 [154] 5.879891e-09 5.729632e-09 5.584143e-09
 [157] 5.443243e-09 5.306758e-09 5.174524e-09
 [160] 5.046384e-09 4.922186e-09 4.801784e-09
 [163] 4.685042e-09 4.571826e-09 4.462010e-09
 [166] 4.355471e-09 4.252092e-09 4.151763e-09
 [169] 4.054375e-09 3.959827e-09 3.868018e-09
 [172] 3.778854e-09 3.692245e-09 3.608103e-09
 [175] 3.526344e-09 3.446888e-09 3.369658e-09
```

```
[178] 3.294578e-09 3.221577e-09 3.150588e-09
[181] 3.081543e-09 3.014379e-09 2.949034e-09
[184] 2.885451e-09 2.823573e-09 2.763344e-09
[187] 2.704712e-09 2.647628e-09 2.592041e-09
[190] 2.537905e-09 2.485176e-09 2.433809e-09
[193] 2.383762e-09 2.334994e-09 2.287468e-09
[196] 2.241145e-09 2.195988e-09 2.151963e-09
[199] 2.109036e-09 2.067173e-09 2.026344e-09
[202] 1.986519e-09 1.947667e-09 1.909760e-09
[205] 1.872770e-09 1.836672e-09 1.801440e-09
[208] 1.767048e-09 1.733474e-09 1.700692e-09
[211] 1.668682e-09 1.637422e-09 1.606890e-09
[214] 1.577067e-09 1.547932e-09 1.519467e-09
[217] 1.491653e-09 1.464472e-09 1.437908e-09
[220] 1.411944e-09 1.386563e-09 1.361750e-09
[223] 1.337489e-09 1.313766e-09 1.290567e-09
[226] 1.267877e-09 1.245684e-09 1.223975e-09
[229] 1.202736e-09 1.181956e-09 1.161623e-09
[232] 1.141725e-09 1.122252e-09 1.103192e-09
[235] 1.084535e-09 1.066270e-09 1.048388e-09
[238] 1.030880e-09 1.013736e-09 9.969464e-10
[241] 9.805031e-10 9.643974e-10 9.486211e-10
[244] 9.331661e-10 9.180245e-10 9.031887e-10
[247] 8.886515e-10 8.744056e-10 8.604440e-10
[250] 8.467599e-10 8.333468e-10 8.201982e-10
[253] 8.073079e-10 7.946699e-10 7.822782e-10
[256] 7.701271e-10 7.582110e-10 7.465244e-10
[259] 7.350622e-10 7.238191e-10 7.127902e-10
[262] 7.019705e-10 6.913554e-10 6.809401e-10
[265] 6.707202e-10 6.606914e-10 6.508492e-10
[268] 6.411897e-10 6.317087e-10 6.224023e-10
[271] 6.132667e-10 6.042980e-10 5.954927e-10
[274] 5.868472e-10 5.783580e-10 5.700218e-10
[277] 5.618352e-10 5.537951e-10 5.458983e-10
[280] 5.381417e-10 5.305224e-10 5.230375e-10
[283] 5.156841e-10 5.084595e-10 5.013609e-10
[286] 4.943858e-10 4.875316e-10 4.807958e-10
[289] 4.741759e-10 4.676695e-10 4.612743e-10
[292] 4.549881e-10 4.488086e-10 4.427337e-10
[295] 4.367611e-10 4.308890e-10 4.251152e-10
[298] 4.194378e-10 4.138549e-10 4.083645e-10
[301] 4.029649e-10 3.976543e-10 3.924308e-10
[304] 3.872928e-10 3.822387e-10 3.772667e-10
[307] 3.723753e-10 3.675629e-10 3.628280e-10
[310] 3.581691e-10 3.535847e-10 3.490735e-10
[313] 3.446339e-10 3.402648e-10 3.359646e-10
[316] 3.317322e-10 3.275662e-10 3.234653e-10
[319] 3.194285e-10 3.154544e-10 3.115420e-10
[322] 3.076900e-10 3.038974e-10 3.001630e-10
[325] 2.964858e-10 2.928647e-10 2.892988e-10
[328] 2.857870e-10 2.823283e-10 2.789217e-10
[331] 2.755664e-10 2.722614e-10 2.690058e-10
[334] 2.657987e-10 2.626392e-10 2.595266e-10
[337] 2.564599e-10 2.534384e-10 2.504612e-10
[340] 2.475277e-10 2.446370e-10 2.417883e-10
[343] 2.389810e-10 2.362143e-10 2.334876e-10
[346] 2.308000e-10 2.281510e-10 2.255400e-10
[349] 2.229661e-10 2.204289e-10 2.179277e-10
[352] 2.154618e-10 2.130307e-10 2.106338e-10
[355] 2.082706e-10 2.059404e-10 2.036426e-10
[358] 2.013769e-10 1.991425e-10 1.969391e-10
[361] 1.947660e-10 1.926229e-10 1.905091e-10
[364] 1.884243e-10 1.863678e-10 1.843394e-10
[367] 1.823385e-10 1.803647e-10 1.784175e-10
[370] 1.764965e-10 1.746013e-10 1.727314e-10
[373] 1.708866e-10 1.690663e-10 1.672701e-10
[376] 1.654978e-10 1.637489e-10 1.620230e-10
[379] 1.603197e-10 1.586389e-10 1.569799e-10
```

```
[382] 1.553426e-10 1.537266e-10 1.521316e-10
[385] 1.505572e-10 1.490031e-10 1.474690e-10
[388] 1.459546e-10 1.444596e-10 1.429837e-10
[391] 1.415266e-10 1.400879e-10 1.386676e-10
[394] 1.372652e-10 1.358804e-10 1.345131e-10
[397] 1.331630e-10 1.318297e-10 1.305131e-10
[400] 1.292129e-10 1.279288e-10 1.266606e-10
[403] 1.254082e-10 1.241711e-10 1.229493e-10
[406] 1.217425e-10 1.205504e-10 1.193729e-10
[409] 1.182097e-10 1.170607e-10 1.159256e-10
[412] 1.148042e-10 1.136963e-10 1.126018e-10
[415] 1.115204e-10 1.104520e-10 1.093963e-10
[418] 1.083533e-10 1.073226e-10 1.063041e-10
[421] 1.052977e-10 1.043032e-10 1.033204e-10
[424] 1.023491e-10 1.013892e-10 1.004406e-10
[427] 9.950301e-11 9.857634e-11 9.766044e-11
[430] 9.675515e-11 9.586032e-11 9.497582e-11
[433] 9.410149e-11 9.323721e-11 9.238282e-11
[436] 9.153819e-11 9.070320e-11 8.987771e-11
[439] 8.906158e-11 8.825470e-11 8.745693e-11
[442] 8.666816e-11 8.588826e-11 8.511712e-11
[445] 8.435461e-11 8.360061e-11 8.285503e-11
[448] 8.211774e-11 8.138863e-11 8.066759e-11
[451] 7.995452e-11 7.924931e-11 7.855186e-11
[454] 7.786207e-11 7.717983e-11 7.650505e-11
[457] 7.583763e-11 7.517746e-11 7.452447e-11
[460] 7.387855e-11 7.323961e-11 7.260757e-11
[463] 7.198233e-11 7.136380e-11 7.075191e-11
[466] 7.014655e-11 6.954766e-11 6.895515e-11
[469] 6.836893e-11 6.778893e-11 6.721507e-11
[472] 6.664726e-11 6.608544e-11 6.552953e-11
[475] 6.497945e-11 6.443513e-11 6.389650e-11
[478] 6.336348e-11 6.283601e-11 6.231402e-11
[481] 6.179743e-11 6.128619e-11 6.078023e-11
[484] 6.027947e-11 5.978386e-11 5.929334e-11
[487] 5.880783e-11 5.832729e-11 5.785164e-11
[490] 5.738083e-11 5.691480e-11 5.645349e-11
[493] 5.599685e-11 5.554482e-11 5.509733e-11
[496] 5.465435e-11 5.421580e-11 5.378165e-11
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> var(y3)
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> z <- rnorm(10000)
> plot(x,z)
```
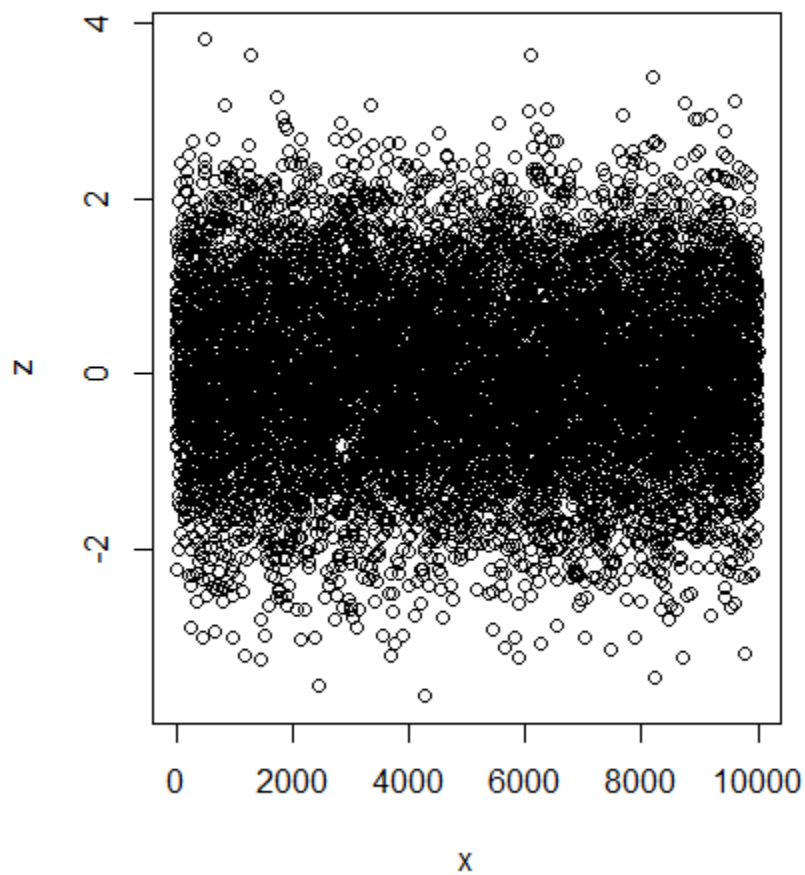
```
> #question9
> b = matrix(rnorm(500, mean = -2, sd = sqrt(3)),nrow = 10
0, ncol = 50, byrow = FALSE )
> c = sum(b[b < 1 & b >-1])
> c
[1] -202.247
> b[abs(b) > 1] = 0
> b
              [,1]         [,2]        [,3]        [,4]
 [1,] -0.77871251 -0.478027063  0.00000000 -0.37229190
 [2,]  0.00000000  0.000000000  0.00000000  0.00000000
 [3,]  0.00000000  0.000000000  0.00000000 -0.28441581
 [4,]  0.00000000  0.000000000  0.00000000  0.00000000
 [5,]  0.00000000  0.000000000  0.25921891  0.00000000
 [6,]  0.00000000  0.000000000  0.00000000  0.00000000
 [7,]  0.00000000  0.000000000  0.00000000  0.00000000
 [8,]  0.00000000  0.000000000  0.00000000  0.00000000
 [9,]  0.00000000  0.000000000  0.00000000  0.00000000
[10,]  0.00000000 -0.934097052  0.00000000  0.00000000
[11,]  0.56216233  0.000000000  0.00000000  0.00000000
[12,]  0.00000000  0.000000000  0.00000000  0.00000000
[13,]  0.00000000  0.000000000  0.00000000  0.00000000
[14,]  0.00000000  0.000000000 -0.09701079 -0.88915998
[15,]  0.00000000  0.000000000  0.00000000  0.00000000
[16,]  0.00000000  0.000000000 -0.25310536  0.65922479
[17,]  0.00000000  0.000000000  0.00000000  0.00000000
[18,]  0.00000000 -0.141466355  0.00000000  0.00000000
[19,]  0.00000000  0.000000000  0.00000000  0.00000000
```

```
[20,]  0.00000000   0.000000000   0.00000000  -0.36853235
               [,5]          [,6]          [,7]          [,8]
 [1,]  0.00000000  -0.77871251  -0.478027063   0.00000000
 [2,]  0.00000000   0.00000000   0.000000000   0.00000000
 [3,] -0.80754105   0.00000000   0.000000000   0.00000000
 [4,]  0.19023887   0.00000000   0.000000000   0.00000000
 [5,]  0.00000000   0.00000000   0.000000000   0.25921891
 [6,]  0.00000000   0.00000000   0.000000000   0.00000000
 [7,]  0.00000000   0.00000000   0.000000000   0.00000000
 [8,]  0.00000000   0.00000000   0.000000000   0.00000000
 [9,]  0.00000000   0.00000000   0.000000000   0.00000000
[10,] -0.93361410   0.00000000  -0.934097052   0.00000000
[11,]  0.00000000   0.56216233   0.000000000   0.00000000
[12,] -0.64634270   0.00000000   0.000000000   0.00000000
[13,]  0.00000000   0.00000000   0.000000000   0.00000000
[14,] -0.09589388   0.00000000   0.000000000  -0.09701079
[15,]  0.00000000   0.00000000   0.000000000   0.00000000
[16,]  0.08922153   0.00000000   0.000000000  -0.25310536
[17,]  0.53845642   0.00000000   0.000000000   0.00000000
[18,]  0.00000000   0.00000000  -0.141466355   0.00000000
[19,]  0.33277210   0.00000000   0.000000000   0.00000000
[20,]  0.00000000   0.00000000   0.000000000   0.00000000
               [,9]         [,10]         [,11]         [,12]
 [1,] -0.37229190   0.00000000  -0.77871251  -0.478027063
 [2,]  0.00000000   0.00000000   0.00000000   0.000000000
 [3,] -0.28441581  -0.80754105   0.00000000   0.000000000
 [4,]  0.00000000   0.19023887   0.00000000   0.000000000
 [5,]  0.00000000   0.00000000   0.00000000   0.000000000
 [6,]  0.00000000   0.00000000   0.00000000   0.000000000
 [7,]  0.00000000   0.00000000   0.00000000   0.000000000
 [8,]  0.00000000   0.00000000   0.00000000   0.000000000
 [9,]  0.00000000   0.00000000   0.00000000   0.000000000
[10,]  0.00000000  -0.93361410   0.00000000  -0.934097052
[11,]  0.00000000   0.00000000   0.56216233   0.000000000
[12,]  0.00000000  -0.64634270   0.00000000   0.000000000
[13,]  0.00000000   0.00000000   0.00000000   0.000000000
[14,] -0.88915998  -0.09589388   0.00000000   0.000000000
[15,]  0.00000000   0.00000000   0.00000000   0.000000000
[16,]  0.65922479   0.08922153   0.00000000   0.000000000
[17,]  0.00000000   0.53845642   0.00000000   0.000000000
[18,]  0.00000000   0.00000000   0.00000000  -0.141466355
[19,]  0.00000000   0.33277210   0.00000000   0.000000000
[20,] -0.36853235   0.00000000   0.00000000   0.000000000
              [,13]         [,14]         [,15]         [,16]
 [1,]  0.00000000  -0.37229190   0.00000000  -0.77871251
 [2,]  0.00000000   0.00000000   0.00000000   0.00000000
 [3,]  0.00000000  -0.28441581  -0.80754105   0.00000000
 [4,]  0.00000000   0.00000000   0.19023887   0.00000000
 [5,]  0.25921891   0.00000000   0.00000000   0.00000000
 [6,]  0.00000000   0.00000000   0.00000000   0.00000000
 [7,]  0.00000000   0.00000000   0.00000000   0.00000000
 [8,]  0.00000000   0.00000000   0.00000000   0.00000000
 [9,]  0.00000000   0.00000000   0.00000000   0.00000000
[10,]  0.00000000   0.00000000  -0.93361410   0.00000000
[11,]  0.00000000   0.00000000   0.00000000   0.56216233
[12,]  0.00000000   0.00000000  -0.64634270   0.00000000
[13,]  0.00000000   0.00000000   0.00000000   0.00000000
[14,] -0.09701079  -0.88915998  -0.09589388   0.00000000
[15,]  0.00000000   0.00000000   0.00000000   0.00000000
[16,] -0.25310536   0.65922479   0.08922153   0.00000000
[17,]  0.00000000   0.00000000   0.53845642   0.00000000
[18,]  0.00000000   0.00000000   0.00000000   0.00000000
[19,]  0.00000000   0.00000000   0.33277210   0.00000000
[20,]  0.00000000  -0.36853235   0.00000000   0.00000000
              [,17]         [,18]         [,19]         [,20]
 [1,] -0.478027063   0.00000000  -0.37229190   0.00000000
 [2,]  0.000000000   0.00000000   0.00000000   0.00000000
 [3,]  0.000000000   0.00000000  -0.28441581  -0.80754105
 [4,]  0.000000000   0.00000000   0.00000000   0.19023887
```

```
[5,]   0.000000000   0.25921891   0.00000000   0.00000000
[6,]   0.000000000   0.00000000   0.00000000   0.00000000
[7,]   0.000000000   0.00000000   0.00000000   0.00000000
[8,]   0.000000000   0.00000000   0.00000000   0.00000000
[9,]   0.000000000   0.00000000   0.00000000   0.00000000
[10,] -0.934097052   0.00000000   0.00000000  -0.93361410
[11,]  0.000000000   0.00000000   0.00000000   0.00000000
[12,]  0.000000000   0.00000000   0.00000000  -0.64634270
[13,]  0.000000000   0.00000000   0.00000000   0.00000000
[14,]  0.000000000  -0.09701079  -0.88915998  -0.09589388
[15,]  0.000000000   0.00000000   0.00000000   0.00000000
[16,]  0.000000000  -0.25310536   0.65922479   0.08922153
[17,]  0.000000000   0.00000000   0.00000000   0.53845642
[18,] -0.141466355   0.00000000   0.00000000   0.00000000
[19,]  0.000000000   0.00000000   0.00000000   0.33277210
[20,]  0.000000000   0.00000000  -0.36853235   0.00000000
              [,21]        [,22]         [,23]        [,24]
[1,]   -0.77871251  -0.478027063   0.00000000  -0.37229190
[2,]    0.00000000   0.000000000   0.00000000   0.00000000
[3,]    0.00000000   0.000000000   0.00000000  -0.28441581
[4,]    0.00000000   0.000000000   0.00000000   0.00000000
[5,]    0.00000000   0.000000000   0.25921891   0.00000000
[6,]    0.00000000   0.000000000   0.00000000   0.00000000
[7,]    0.00000000   0.000000000   0.00000000   0.00000000
[8,]    0.00000000   0.000000000   0.00000000   0.00000000
[9,]    0.00000000   0.000000000   0.00000000   0.00000000
[10,]   0.00000000  -0.934097052   0.00000000   0.00000000
[11,]   0.56216233   0.000000000   0.00000000   0.00000000
[12,]   0.00000000   0.000000000   0.00000000   0.00000000
[13,]   0.00000000   0.000000000   0.00000000   0.00000000
[14,]   0.00000000   0.000000000  -0.09701079  -0.88915998
[15,]   0.00000000   0.000000000   0.00000000   0.00000000
[16,]   0.00000000   0.000000000  -0.25310536   0.65922479
[17,]   0.00000000   0.000000000   0.00000000   0.00000000
[18,]   0.00000000  -0.141466355   0.00000000   0.00000000
[19,]   0.00000000   0.000000000   0.00000000   0.00000000
[20,]   0.00000000   0.000000000   0.00000000  -0.36853235
              [,25]        [,26]         [,27]        [,28]
[1,]    0.00000000  -0.77871251  -0.478027063   0.00000000
[2,]    0.00000000   0.00000000   0.000000000   0.00000000
[3,]   -0.80754105   0.00000000   0.000000000   0.00000000
[4,]    0.19023887   0.00000000   0.000000000   0.00000000
[5,]    0.00000000   0.00000000   0.000000000   0.25921891
[6,]    0.00000000   0.00000000   0.000000000   0.00000000
[7,]    0.00000000   0.00000000   0.000000000   0.00000000
[8,]    0.00000000   0.00000000   0.000000000   0.00000000
[9,]    0.00000000   0.00000000   0.000000000   0.00000000
[10,]  -0.93361410   0.00000000  -0.934097052   0.00000000
[11,]   0.00000000   0.56216233   0.000000000   0.00000000
[12,]  -0.64634270   0.00000000   0.000000000   0.00000000
[13,]   0.00000000   0.00000000   0.000000000   0.00000000
[14,]  -0.09589388   0.00000000   0.000000000  -0.09701079
[15,]   0.00000000   0.00000000   0.000000000   0.00000000
[16,]   0.08922153   0.00000000   0.000000000  -0.25310536
[17,]   0.53845642   0.00000000   0.000000000   0.00000000
[18,]   0.00000000   0.00000000  -0.141466355   0.00000000
[19,]   0.33277210   0.00000000   0.000000000   0.00000000
[20,]   0.00000000   0.00000000   0.000000000   0.00000000
              [,29]        [,30]         [,31]        [,32]
[1,]   -0.37229190   0.00000000  -0.77871251  -0.478027063
[2,]    0.00000000   0.00000000   0.00000000   0.000000000
[3,]   -0.28441581  -0.80754105   0.00000000   0.000000000
[4,]    0.00000000   0.19023887   0.00000000   0.000000000
[5,]    0.00000000   0.00000000   0.00000000   0.000000000
[6,]    0.00000000   0.00000000   0.00000000   0.000000000
[7,]    0.00000000   0.00000000   0.00000000   0.000000000
[8,]    0.00000000   0.00000000   0.00000000   0.000000000
[9,]    0.00000000   0.00000000   0.00000000   0.000000000
[10,]   0.00000000  -0.93361410   0.00000000  -0.934097052
```

```
[11,]  0.00000000  0.00000000  0.56216233  0.000000000
[12,]  0.00000000 -0.64634270  0.00000000  0.000000000
[13,]  0.00000000  0.00000000  0.00000000  0.000000000
[14,] -0.88915998 -0.09589388  0.00000000  0.000000000
[15,]  0.00000000  0.00000000  0.00000000  0.000000000
[16,]  0.65922479  0.08922153  0.00000000  0.000000000
[17,]  0.00000000  0.53845642  0.00000000  0.000000000
[18,]  0.00000000  0.00000000  0.00000000 -0.141466355
[19,]  0.00000000  0.33277210  0.00000000  0.000000000
[20,] -0.36853235  0.00000000  0.00000000  0.000000000
            [,33]       [,34]       [,35]       [,36]
 [1,]  0.00000000 -0.37229190  0.00000000 -0.77871251
 [2,]  0.00000000  0.00000000  0.00000000  0.00000000
 [3,]  0.00000000 -0.28441581 -0.80754105  0.00000000
 [4,]  0.00000000  0.00000000  0.19023887  0.00000000
 [5,]  0.25921891  0.00000000  0.00000000  0.00000000
 [6,]  0.00000000  0.00000000  0.00000000  0.00000000
 [7,]  0.00000000  0.00000000  0.00000000  0.00000000
 [8,]  0.00000000  0.00000000  0.00000000  0.00000000
 [9,]  0.00000000  0.00000000  0.00000000  0.00000000
[10,]  0.00000000  0.00000000 -0.93361410  0.00000000
[11,]  0.00000000  0.00000000  0.00000000  0.56216233
[12,]  0.00000000  0.00000000 -0.64634270  0.00000000
[13,]  0.00000000  0.00000000  0.00000000  0.00000000
[14,] -0.09701079 -0.88915998 -0.09589388  0.00000000
[15,]  0.00000000  0.00000000  0.00000000  0.00000000
[16,] -0.25310536  0.65922479  0.08922153  0.00000000
[17,]  0.00000000  0.00000000  0.53845642  0.00000000
[18,]  0.00000000  0.00000000  0.00000000  0.00000000
[19,]  0.00000000  0.00000000  0.33277210  0.00000000
[20,]  0.00000000 -0.36853235  0.00000000  0.00000000
            [,37]       [,38]       [,39]       [,40]
 [1,] -0.478027063  0.00000000 -0.37229190  0.00000000
 [2,]  0.000000000  0.00000000  0.00000000  0.00000000
 [3,]  0.000000000  0.00000000 -0.28441581 -0.80754105
 [4,]  0.000000000  0.00000000  0.00000000  0.19023887
 [5,]  0.000000000  0.25921891  0.00000000  0.00000000
 [6,]  0.000000000  0.00000000  0.00000000  0.00000000
 [7,]  0.000000000  0.00000000  0.00000000  0.00000000
 [8,]  0.000000000  0.00000000  0.00000000  0.00000000
 [9,]  0.000000000  0.00000000  0.00000000  0.00000000
[10,] -0.934097052  0.00000000  0.00000000 -0.93361410
[11,]  0.000000000  0.00000000  0.00000000  0.00000000
[12,]  0.000000000  0.00000000  0.00000000 -0.64634270
[13,]  0.000000000  0.00000000  0.00000000  0.00000000
[14,]  0.000000000 -0.09701079 -0.88915998 -0.09589388
[15,]  0.000000000  0.00000000  0.00000000  0.00000000
[16,]  0.000000000 -0.25310536  0.65922479  0.08922153
[17,]  0.000000000  0.00000000  0.00000000  0.53845642
[18,] -0.141466355  0.00000000  0.00000000  0.00000000
[19,]  0.000000000  0.00000000  0.00000000  0.33277210
[20,]  0.000000000  0.00000000 -0.36853235  0.00000000
            [,41]       [,42]        [,43]       [,44]
 [1,] -0.77871251 -0.478027063  0.00000000 -0.37229190
 [2,]  0.00000000  0.000000000  0.00000000  0.00000000
 [3,]  0.00000000  0.000000000  0.00000000 -0.28441581
 [4,]  0.00000000  0.000000000  0.00000000  0.00000000
 [5,]  0.00000000  0.000000000  0.25921891  0.00000000
 [6,]  0.00000000  0.000000000  0.00000000  0.00000000
 [7,]  0.00000000  0.000000000  0.00000000  0.00000000
 [8,]  0.00000000  0.000000000  0.00000000  0.00000000
 [9,]  0.00000000  0.000000000  0.00000000  0.00000000
[10,]  0.00000000 -0.934097052  0.00000000  0.00000000
[11,]  0.56216233  0.000000000  0.00000000  0.00000000
[12,]  0.00000000  0.000000000  0.00000000  0.00000000
[13,]  0.00000000  0.000000000  0.00000000  0.00000000
[14,]  0.00000000  0.000000000 -0.09701079 -0.88915998
[15,]  0.00000000  0.000000000  0.00000000  0.00000000
[16,]  0.00000000  0.000000000 -0.25310536  0.65922479
```

```
[17,]   0.00000000   0.000000000   0.00000000   0.00000000
[18,]   0.00000000  -0.141466355   0.00000000   0.00000000
[19,]   0.00000000   0.000000000   0.00000000   0.00000000
[20,]   0.00000000   0.000000000   0.00000000  -0.36853235
              [,45]         [,46]          [,47]         [,48]
 [1,]   0.00000000  -0.77871251  -0.478027063   0.00000000
 [2,]   0.00000000   0.00000000   0.000000000   0.00000000
 [3,]  -0.80754105   0.00000000   0.000000000   0.00000000
 [4,]   0.19023887   0.00000000   0.000000000   0.00000000
 [5,]   0.00000000   0.00000000   0.000000000   0.25921891
 [6,]   0.00000000   0.00000000   0.000000000   0.00000000
 [7,]   0.00000000   0.00000000   0.000000000   0.00000000
 [8,]   0.00000000   0.00000000   0.000000000   0.00000000
 [9,]   0.00000000   0.00000000   0.000000000   0.00000000
[10,]  -0.93361410   0.00000000  -0.934097052   0.00000000
[11,]   0.00000000   0.56216233   0.000000000   0.00000000
[12,]  -0.64634270   0.00000000   0.000000000   0.00000000
[13,]   0.00000000   0.00000000   0.000000000   0.00000000
[14,]  -0.09589388   0.00000000   0.000000000  -0.09701079
[15,]   0.00000000   0.00000000   0.000000000   0.00000000
[16,]   0.08922153   0.00000000   0.000000000  -0.25310536
[17,]   0.53845642   0.00000000   0.000000000   0.00000000
[18,]   0.00000000   0.00000000  -0.141466355   0.00000000
[19,]   0.33277210   0.00000000   0.000000000   0.00000000
[20,]   0.00000000   0.00000000   0.000000000   0.00000000
              [,49]         [,50]
 [1,]  -0.37229190   0.00000000
 [2,]   0.00000000   0.00000000
 [3,]  -0.28441581  -0.80754105
 [4,]   0.00000000   0.19023887
 [5,]   0.00000000   0.00000000
 [6,]   0.00000000   0.00000000
 [7,]   0.00000000   0.00000000
 [8,]   0.00000000   0.00000000
 [9,]   0.00000000   0.00000000
[10,]   0.00000000  -0.93361410
[11,]   0.00000000   0.00000000
[12,]   0.00000000  -0.64634270
[13,]   0.00000000   0.00000000
[14,]  -0.88915998  -0.09589388
[15,]   0.00000000   0.00000000
[16,]   0.65922479   0.08922153
[17,]   0.00000000   0.53845642
[18,]   0.00000000   0.00000000
[19,]   0.00000000   0.33277210
[20,]  -0.36853235   0.00000000
[ reached getOption("max.print") -- omitted 80 rows ]
> #question 10
> x1 <- c(2,4)
> y1 <- c(6,8)
> x2 <- c(1,2,3)
> y2 <- c(1,2,3,4)
> myfunction <- function(arg1, arg2)
+ if(length(arg1) == length(arg2)){
+     a1 = mean(arg1);
+     a2 = mean(arg2);
+     b = cov(arg1,arg2);
+     c = var(arg1,arg2);
+     print(a1);
+     print(a2);
+     print(b);
+     print(c)}else{
+       print("The lengths of the two arguments are not equ
al")
+       }
> myfunction(x1,y1)
[1] 3
[1] 7
[1] 2
```

```
[1] 2
> myfunction(x2,y2)
[1] "The lengths of the two arguments are not equal"

>
```