

Assignment__2__1.R

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#1.a

```
A <- matrix(c(1, 5, -2, 1, 2, -1, 3, 6, -3), ncol = 3)
A %*% A %*% A
```

```
##      [,1] [,2] [,3]
## [1,]    0    0    0
## [2,]    0    0    0
## [3,]    0    0    0
```

#1.b

```
A[,3] <- A[,2] + A[,3]
```

#2

```
B <- matrix(rep(c(10, -10, 10), c(15, 15, 15)), ncol= 3)
```

```
crossprod(B)
```

```
##      [,1] [,2] [,3]
## [1,] 1500 -1500 1500
## [2,] -1500 1500 -1500
## [3,] 1500 -1500 1500
```

#3

```
matE <- matrix(0, 6, 6)
matE[abs(col(matE) - row(matE)) == 1] <- 1
```

#4

```
outer(0:4, 0:4, "+")
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]    0    1    2    3    4
## [2,]    1    2    3    4    5
## [3,]    2    3    4    5    6
## [4,]    3    4    5    6    7
## [5,]    4    5    6    7    8
```

#5.a

```
outer(0:4, 0:4, "+") %% 5
```

```
##      [,1] [,2] [,3] [,4] [,5]
## [1,]    0    1    2    3    4
## [2,]    1    2    3    4    0
## [3,]    2    3    4    0    1
## [4,]    3    4    0    1    2
## [5,]    4    0    1    2    3
```

#5.b

```
outer(0:9, 0:9, "+") %% 10
```

```
##      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9] [,10]
## [1,]    0    1    2    3    4    5    6    7    8    9
## [2,]    1    2    3    4    5    6    7    8    9    0
## [3,]    2    3    4    5    6    7    8    9    0    1
## [4,]    3    4    5    6    7    8    9    0    1    2
## [5,]    4    5    6    7    8    9    0    1    2    3
## [6,]    5    6    7    8    9    0    1    2    3    4
## [7,]    6    7    8    9    0    1    2    3    4    5
## [8,]    7    8    9    0    1    2    3    4    5    6
## [9,]    8    9    0    1    2    3    4    5    6    7
## [10,]   9    0    1    2    3    4    5    6    7    8
```

```
#5.c
outer(0:8, 0:8, "-") %% 9
```

```
##      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8] [,9]
## [1,]    0    8    7    6    5    4    3    2    1
## [2,]    1    0    8    7    6    5    4    3    2
## [3,]    2    1    0    8    7    6    5    4    3
## [4,]    3    2    1    0    8    7    6    5    4
## [5,]    4    3    2    1    0    8    7    6    5
## [6,]    5    4    3    2    1    0    8    7    6
## [7,]    6    5    4    3    2    1    0    8    7
## [8,]    7    6    5    4    3    2    1    0    8
## [9,]    8    7    6    5    4    3    2    1    0
```

```
#6
A <- matrix(0, 5, 5)
An <- matrix(abs(row(A) - col(A)) + 1, 5, 5)
b <- c(7, -1, -3, 5, 17)
solve(An, b)
```

```
## [1] -2  3  5  2 -4
```

```
#7.a
set.seed(75)
aMat <- matrix(sample(10, size = 60, replace = T), nr = 6)

apply(aMat, 1, function(x){sum(x > 4)})
```

```
## [1] 4 7 6 2 6 7
```

```
#7.b
which( apply(aMat, 1, function(x){sum(x == 7) == 2}) )
```

```
## [1] 5
```

```
#or
MaT <- apply(aMat, 1, function(x){ x %% 7 == 0 })
Sev <- apply(MaT, 2, function(x){sum(x)})
(1 : length(Sev))[Sev == 2 ]
```

```
## [1] 5
```

```
#7.c
aMatsum <- colSums(aMat)
```

```
which(outer(aMatsum, aMatsum, "+") > 75, arr.ind = T)
```

```
##      row col
## [1,]   2   2
## [2,]   6   2
## [3,]   8   2
## [4,]   2   6
## [5,]   8   6
## [6,]   2   8
## [7,]   6   8
## [8,]   8   8
```

```
#8.a
```

```
sum((1 : 20) ^ 4) * sum(1 / (4 : 8))
```

```
## [1] 639215.3
```

```
#8.b
```

```
sum((1 : 20) ^ 4 / (3 + outer(1 : 20, 1 : 5, "*")))
```

```
## [1] 89912.02
```

```
#8.c
```

```
sum(outer(1 : 10, 1 : 10, function(i, k){ (i >= k) * i ^ 4/(3 + i * k)}))
```

```
## [1] 6944.743
```