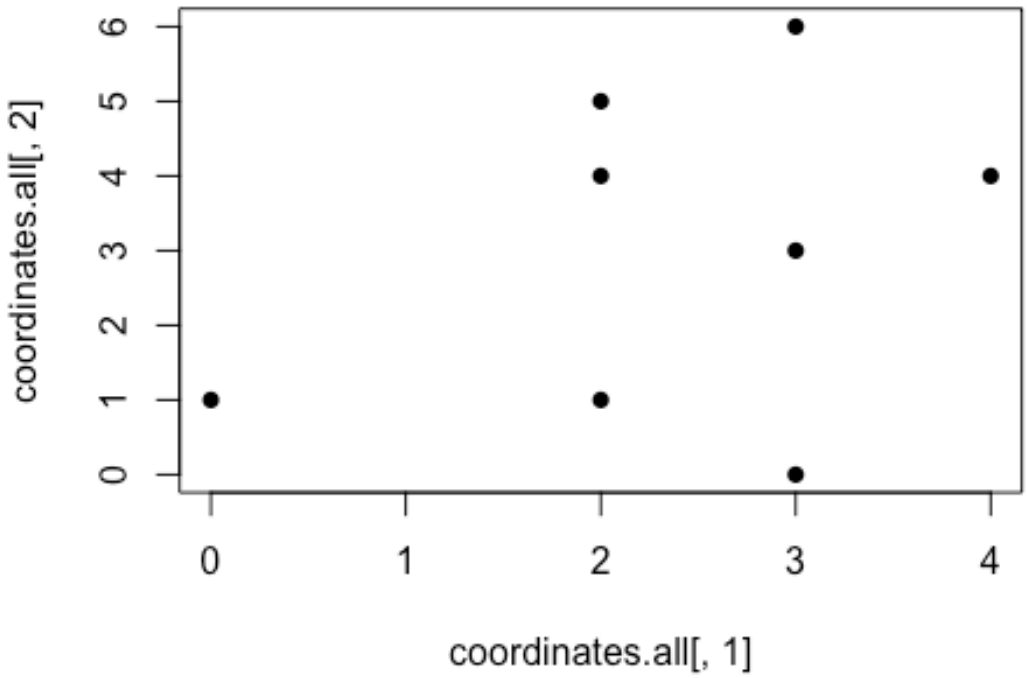
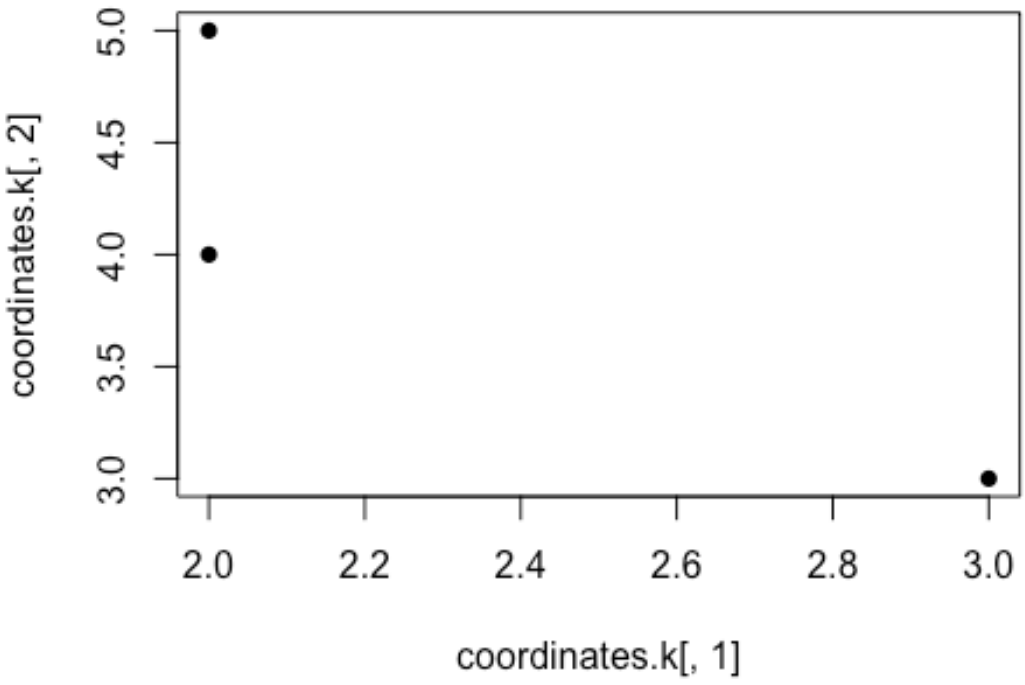
A1_Problem2

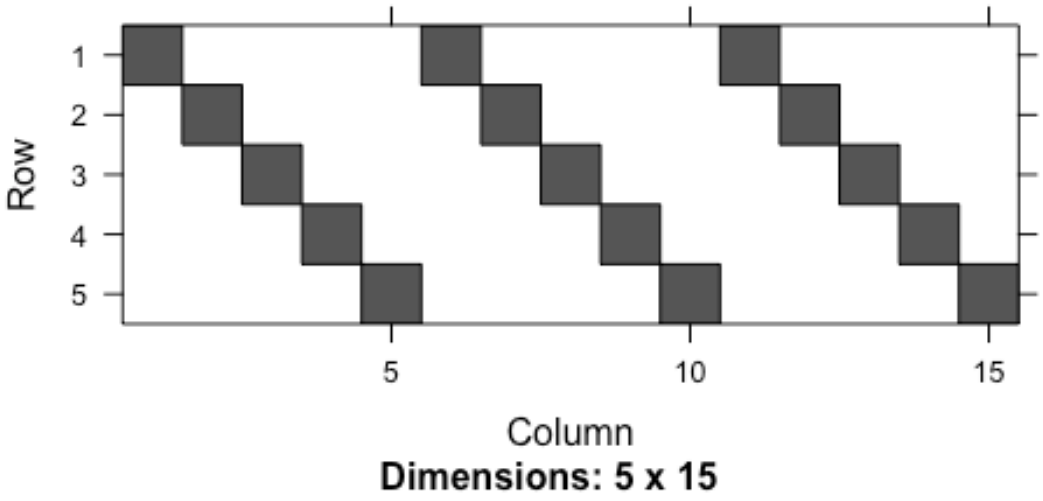
```
library("gurobi")

## Loading required package: slam

library("Matrix")
library("igraph")

##
## Attaching package: 'igraph'

## The following objects are masked from 'package:stats':
##
##     decompose, spectrum

## The following object is masked from 'package:base':
##
##     union

library("rdist")

L = 5
K = 3

coordinates.l = matrix(c(3,6,4,4,3,0,2,1,0,1), nrow=L, ncol=2, byrow =
TRUE)
coordinates.k = matrix(c(3,3,2,4,2,5), nrow=K, ncol=2, byrow = TRUE)
coordinates.all = rbind(coordinates.l, coordinates.k)

P.kl = cdist(coordinates.k, coordinates.l, metric = "euclidean", p = 2)

plot(coordinates.all[,1], coordinates.all[,2], pch=16)
```




```r
plot(coordinates.k[,1], coordinates.k[,2], pch=16)
```




```
D.l = sample(c(20,40,15,30,25))
cvec = c(as.vector(t(P.kl)))
bvec = c(1,1,1,1,1)
dir = c("=","=","=","=","=")

Amat = matrix(0, nrow=(L), ncol=(L*K))
Amat[1,] = c(1,0,0,0,0,1,0,0,0,0,1,0,0,0,0)
Amat[2,] = c(0,1,0,0,0,0,1,0,0,0,0,1,0,0,0)
Amat[3,] = c(0,0,1,0,0,0,0,1,0,0,0,0,1,0,0)
Amat[4,] = c(0,0,0,1,0,0,0,0,1,0,0,0,0,1,0)
Amat[5,] = c(0,0,0,0,1,0,0,0,0,1,0,0,0,0,1)

image(Matrix(Amat))
```




```
myLP = list()
myLP$obj = cvec
myLP$A = Amat
myLP$sense = dir
myLP$rhs = bvec
myLP$vtypes = "C"
myLP$ub = 1

mysol = gurobi(myLP)

## Warning for adding variables: zero or small (< 1e-13) coefficients,
ignored
## Optimize a model with 5 rows, 15 columns and 15 nonzeros
## Coefficient statistics:
##   Matrix range     [1e+00, 1e+00]
##   Objective range  [1e+00, 5e+00]
##   Bounds range     [1e+00, 1e+00]
##   RHS range        [1e+00, 1e+00]
## Presolve removed 5 rows and 15 columns
## Presolve time: 0.01s
## Presolve: All rows and columns removed
## Iteration    Objective       Primal Inf.    Dual Inf.      Time
##         0    1.1670046e+01   0.000000e+00   0.000000e+00      0s
```

```
##
## Solved in 0 iterations and 0.01 seconds
## Optimal objective  1.167004638e+01
```

```
mysol$objval
```

```
## [1] 11.67005
```

```
mysol$x
```

```
##  [1] 0 1 1 1 0 0 0 0 0 1 1 0 0 0 0
```