

1806554 Test (R Language) DA Lab

1

a

In [50]:

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

```
      [,1] [,2] [,3]
[1,]     1     1     3
[2,]     5     2     6
[3,]    -2    -1    -3
      [,1] [,2] [,3]
[1,]     0     0     0
[2,]     0     0     0
[3,]     0     0     0
```

b

In [42]:

```
A[,3] <- A[,2]+A[,3]
print(A)
```

```
      [,1] [,2] [,3]
[1,]     1     1     4
[2,]     5     2     8
[3,]    -2    -1    -4
```

2

In [35]:

```
tmpFn <- function(x){
  n <- length(x)
  (x[1:(n-2)]+x[2:(n-1)]+x[3:n])/3
}
round(tmpFn(c(1:5,6:1)),2)
```

1. 2
2. 3
3. 4
4. 5
5. 5.33

6.5
7.4
8.3
9.2

3

a

In [47]:

```
empiricalCopula <- function(u,v,xVec,yVec){
  n <- length(xVec)
  rVecN <- rank(xVec)/(n+1)
  sVecN <- rank(yVec)/(n+1)
  sum((rVecN <= u)&(sVecN <= v))/n
}
empiricalCopula(c(0,1),c(0,1),c(7,3,1,4),c(4,2,1,3))
```

0.5

b

In [48]:

```
empiricalCopula <- function(u,v,xVec,yVec){
  n <- length(xVec)
  rVecN <- rank(xVec)/(n+1)
  sVecN <- rank(yVec)/(n+1)
  valuesN <- colSums(outer(rVecN,u,"<=")&outer(sVecN,v,"<="))
  cbind( uCoord = u, vCoord = v, empCop=valuesN/n )
}
empiricalCopula(c(0,1),c(0,1),c(7,3,1,4),c(4,2,1,3))
```

uCoord	vCoord	empCop
0	0	0
1	1	1

4

In [51]:

```
print(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

In []:

In []: