Matriks

Mendefinisikan matriks

```
b <- 1:10
b
```

1. 1
2. 2
3. 3
4. 4
5. 5
6. 6
7. 7
8. 8
9. 9
10. 10

```
matrix(b) # 10 x 1
```

1
2
3
4
5
6
7
8
9
10

```
matrix(b, nrow=2, ncol= 5) # by column
```

1	3	5	7	9
2	4	6	8	10

```
matrix(b, nrow=2, ncol= 5, byrow = T) # by row
```

1	2	3	4	5
6	7	8	9	10

```
matrix(1:12, nrow = 4, byrow=TRUE) # 4 x 3 by row
```

1	2	3
4	5	6
7	8	9
10	11	12

```
# Mendefinisikan matriks dari vektor
fb <- c(250,255,260,263,265) # bayangkan sebagai harga saham
ms <- c(455,460,465,479, 470)
```

```
saham <- c(fb, ms)
saham
```

1. 250
2. 255
3. 260
4. 263
5. 265
6. 455
7. 460
8. 465
9. 479
10. 470

```
matriks.saham <- matrix(saham, nrow=2, byrow=T)
matriks.saham
```

250	255	260	263	265
455	460	465	479	470

```
# Menamakan baris dan kolom
```

```
hari <- c('sen', 'sel', 'rab', 'kam', 'jum')
perusahaan <- c('fb', 'ms')
```

```
colnames(matriks.saham) <- hari
rownames(matriks.saham) <- perusahaan
```

```
matriks.saham
```

	sen	sel	rab	kam	jum
fb	250	255	260	263	265
ms	455	460	465	479	470

Aritmatika matriks

```
mat <- matrix(1:25, nrow=5, byrow=T)
mat
```

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

```
mat * mat # element-by-element
```

1	4	9	16	25
36	49	64	81	100
121	144	169	196	225
256	289	324	361	400
441	484	529	576	625

```
mat / mat
```

1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1
1	1	1	1	1

```
mat^2
```

1	4	9	16	25
36	49	64	81	100
121	144	169	196	225
256	289	324	361	400
441	484	529	576	625

```
1 / mat
```

1.00000000	0.50000000	0.33333333	0.25000000	0.20000000
0.16666667	0.14285714	0.12500000	0.11111111	0.10000000
0.09090909	0.08333333	0.07692308	0.07142857	0.06666667
0.06250000	0.05882353	0.05555556	0.05263158	0.05000000
0.04761905	0.04545455	0.04347826	0.04166667	0.04000000

```
# Operator perbandingan di matriks
```

```
mat > 10
```

FALSE	FALSE	FALSE	FALSE	FALSE
FALSE	FALSE	FALSE	FALSE	FALSE
TRUE	TRUE	TRUE	TRUE	TRUE
TRUE	TRUE	TRUE	TRUE	TRUE
TRUE	TRUE	TRUE	TRUE	TRUE

```
mat[mat > 10]
```

1. 11
2. 16
3. 21
4. 12
5. 17
6. 22
7. 13
8. 18
9. 23
10. 14
11. 19
12. 24
13. 15
14. 20
15. 25

```
mat
```

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

```
# Perkalian matriks
mat %*% mat
```

215	230	245	260	275
490	530	570	610	650
765	830	895	960	1025
1040	1130	1220	1310	1400
1315	1430	1545	1660	1775

Operasi - operasi di matriks

```
# Mendefinisikan matriks dari vektor
fb <- c(250,255,260,263,265)
ms <- c(455,460,465,479, 470)
saham <- c(fb, ms)
matriks.saham <- matrix(saham, nrow=2, byrow=T)
colnames(matriks.saham) <- c('sen', 'sel', 'rab', 'kam', 'jum')
rownames(matriks.saham) <-  c('fb', 'ms')
matriks.saham
```

	sen	sel	rab	kam	jum
fb	250	255	260	263	265
ms	455	460	465	479	470

```
colSums(matriks.saham) # penjumlahan pada kolom
```

```
sen
705
sel
715
rab
725
kam
742
jum
735
```

```
rowSums(matriks.saham)
```

fb
: 1293

ms
: 2329

```
rowMeans(matriks.saham)
```

fb
: 258.6

ms
: 465.8

```
colMeans(matriks.saham)
```

sen
: 352.5

sel
: 357.5

rab
: 362.5

kam
: 371

jum
: 367.5

```
# Menambahkan kolom dan baris ke matriks
```

```
google <- c(175,180,185,195,190)
saham.int <- rbind(matriks.saham, google)
saham.int
```

	sen	sel	rab	kam	jum
fb	250	255	260	263	265
ms	455	460	465	479	470
google	175	180	185	195	190

```
# Menambahkan kolom ke matriks
rata2 <- rowMeans(saham.int)
rata2
```

fb
: 258.6

ms
: 465.8

google
: 185

```
saham.int <- cbind(saham.int, rata2)
saham.int
```

	sen	sel	rab	kam	jum	rata2
fb	250	255	260	263	265	258.6
ms	455	460	465	479	470	465.8
google	175	180	185	195	190	185.0

Seleksi dan pengindeksan matriks

```
v <- c(10,20,30,40,50)
v
```

1. 10
2. 20
3. 30
4. 40
5. 50

```
v[3]
```

30

```
mat <- matrix(1:25, nrow=5, byrow=T)
mat
```

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

```
mat[1,] # baris 1, seluruh kolom
```

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

```
mat[2,3]
```

8

```
mat[3,4]
```

14

```
mat[,3]
```

1. 3
2. 8
3. 13
4. 18
5. 23

```
mat
```

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

```
mat[,5]
```

1. 5
2. 10
3. 15
4. 20
5. 25

```
mat[1:3,] # baris 1 sampai 3
```

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15

```
mat[,4:5] # kolom 4 hingga 5
```

4	5
9	10
14	15
19	20
24	25

```
mat[1:2, 1:3] # baris 1 sampai 2, kolom 1 sampai 3
```

1	2	3
6	7	8

```
mat
```

1	2	3	4	5
6	7	8	9	10
11	12	13	14	15
16	17	18	19	20
21	22	23	24	25

```
mat[3:5, 3:5]
```

13	14	15
18	19	20
23	24	25

Fungsi `factor()`

```
vek.warna <- c('merah', 'hijau', 'biru', 'merah', 'merah', 'hijau', 'biru')
```

```
vek.warna
```

1. 'merah'
2. 'hijau'
3. 'biru'
4. 'merah'
5. 'merah'
6. 'hijau'
7. 'biru'

```
fact.warna <- factor(vek.warna, ordered=T, levels=c('merah', 'hijau', 'biru'))
fact.warna
```

1. merah
2. hijau
3. biru
4. merah
5. merah
6. hijau
7. biru

▶ **Levels**:

```
summary(fact.warna)
```

merah
3
hijau
2
biru
2

```
summary(vek.warna)
```

```
   Length     Class      Mode
        7 character character
```