

# Advanced Vector Toolkit (Examples)

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## Preliminary Code

```
> library (vectools)
```

## Object Arrays

```
> myobject <- structure (0, class="myclass")
> objtag.myclass <- function (object, ...) "<X>"

> v <- ObjectArray ("myclass", c (8, 8) )
> v [[1, 1]] <- myobject

> v
```

```
      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]
[1,] <X>  .   .   .   .   .   .   .
[2,] .   .   .   .   .   .   .   .
[3,] .   .   .   .   .   .   .   .
[4,] .   .   .   .   .   .   .   .
[5,] .   .   .   .   .   .   .   .
[6,] .   .   .   .   .   .   .   .
[7,] .   .   .   .   .   .   .   .
[8,] .   .   .   .   .   .   .   .
```

```
> head (v, 3)
```

```
      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]
[1,] <X>  .   .   .   .   .   .   .
[2,] .   .   .   .   .   .   .   .
[3,] .   .   .   .   .   .   .   .
```

## Block Matrices

```
> x <- matrix (1:16, 4, 4)

> pm <- as.PartMatrix (x, c (1, 3), c (1, 3) )
> nm <- as.NestMatrix (pm)

> nm

      [,1] [,2] [,3]
[1,] <m 1x1> <m 1x2> <m 1x1>
[2,] <m 2x1> <m 2x2> <m 2x1>
[3,] <m 1x1> <m 1x2> <m 1x1>

> pm

      [,1] [,2] [,3] [,4]
[1,]  1  |  5   9  | 13
      -- + --  --  + --
[2,]  2  |  6  10  | 14
[3,]  3  |  7  11  | 15
      -- + --  --  + --
[4,]  4  |  8  12  | 16

> nm [[1, 2]]

[1] 5 9

> nm [[1, 2, drop=FALSE]]

      [,1] [,2]
[1,]    5    9
```

## Block Matrix Generalizations

```

> x <- matrix (1:64, 8, 8)

> sm <- as.SectMatrix (x, vmap = n22 (
  1, 8, #1
  1, 8,
  3, 8, #2
  3, 8,
  5, 8, #3
  5, 8,
  7, 8, #4
  7, 8
) )

> sm
      [,1] [,2] [,3] [,4] [,5] [,6] [,7] [,8]
[1,]  1   9   17  25   33  41   49  57
[2,]  2  10   18  26   34  42   50  58
      + -- -- -- -- -- -- --
[3,]  3  11 | 19  27   35  43   51  59
[4,]  4  12 | 20  28   36  44   52  60
      |           + -- -- -- -- --
[5,]  5  13 | 21  29 | 37  45   53  61
[6,]  6  14 | 22  30 | 38  46   54  62
      |           |           + -- --
[7,]  7  15 | 23  31 | 39  47 | 55  63
[8,]  8  16 | 24  32 | 40  48 | 56  64

> getSect (sm, 3)
      [,1] [,2] [,3] [,4]
[1,]  37  45  53  61
[2,]  38  46  54  62
[3,]  39  47  55  63
[4,]  40  48  56  64

```

## SQL-Like Functions

```
> #grouped by am and cyl
> #with mean of mpg, by group
> select (am, cyl,
         from (mtcars),
         group.by (am, cyl),
         count <- length (mpg),
         mean.mpg <- mean (mpg) )
```

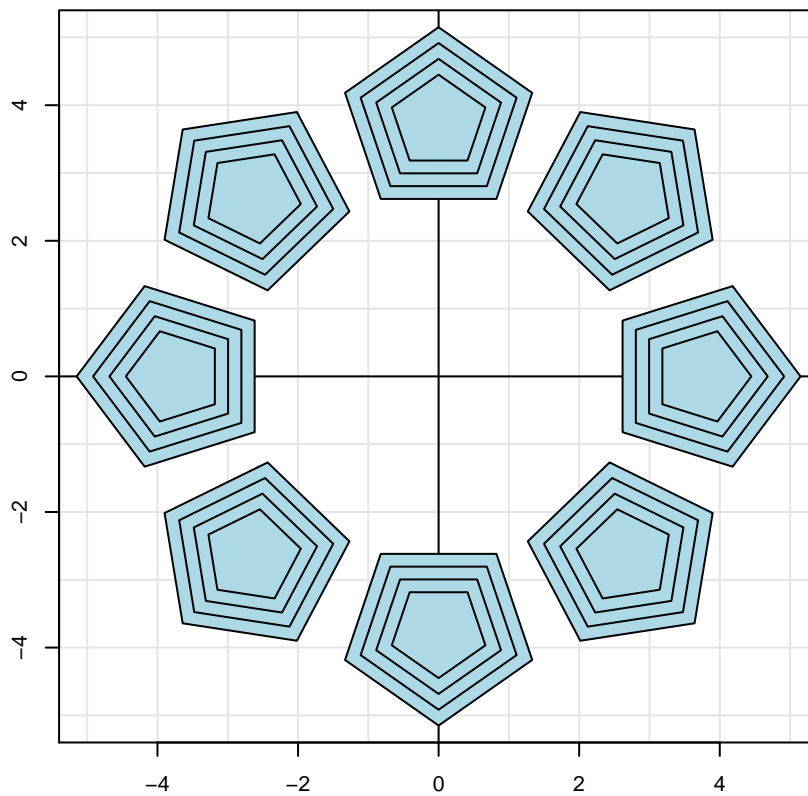
	am	cyl	count	mean.mpg
1	0	4	3	22.90000
2	0	6	4	19.12500
3	0	8	12	15.05000
4	1	4	8	28.07500
5	1	6	3	20.56667
6	1	8	2	15.40000

```
> #same as above
> #but partitioned and sorted
> selectf (am, cyl,
          from (mtcars),
          group.by (am, cyl), partition.by (am), sort.by (-am, -mean.mpg),
          count <- length (mpg),
          mean.mpg <- mean (mpg) )
```

	am	cyl	count	mean.mpg
1	1	4	8	28.07500
2	1	6	3	20.56667
3	1	8	2	15.40000
4	0	4	3	22.90000
5	0	6	4	19.12500
6	0	8	12	15.05000

## Matrix Array Operations

```
> #single polygon
> ps <- c(0, 1) %|*% eq.brot2(5)
> #multiple polygons
> vm <- ps %]*% (
  bscl2(seq(1.4, 0.7,, 4)) %**% #scale
  btrl2(,3.75) %*}% #translate
  eq.brot2(8) ) #rotate
> polyplot(vm)
```



## Grouped Head

```
> ghead (iris)
```

	Sepal.Length	Sepal.Width	Petal.Length	Petal.Width	Species
[1,]	5.1	3.5	1.4	0.2	setosa
[2,]	4.9	3.0	1.4	0.2	setosa
[3,]	4.7	3.2	1.3	0.2	setosa
[4,]	7.0	3.2	4.7	1.4	versicolor
[5,]	6.4	3.2	4.5	1.5	versicolor
[6,]	6.9	3.1	4.9	1.5	versicolor
[7,]	6.3	3.3	6.0	2.5	virginica
[8,]	5.8	2.7	5.1	1.9	virginica
[9,]	7.1	3.0	5.9	2.1	virginica

## Combined Head and Tail (Using The SectMatrix Object)

```
> headt (sm, 6, c (1, 2) )
```

	[,1]	[,2]	[,3]	[,4]	[,7]	[,8]
[1,]	1	9	17	25	. 49	57
[2,]	2	10	18	26	. 50	58
			+	--	--	--
[3,]	3	11	19	27	. 51	59
[4,]	4	12	20	28	. 52	60
					+	--
..	..	..	..	..	..	..
[8,]	8	16	24	32	. 56	64