

## Machine Learning - 1100-MLOENG (Ćwiczenia informatyczne Z-23/24)

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### Combining vectors into a matrix

We now discuss methods of combining the data of these four variables: **cbind**, and **rbind**. functions. First the **cbind** function. It combines the variables in such a way that the output contains the original variables in columns. For example, the output of the **cbind** function below is stored in Z.

```
Z <- cbind(Wingcrd, Tarsus, Head, Wt)
Z
```

The **rbind()** function does something similar. It binds the vectors as rows of a matrix.

```
Z2 <- rbind(Wingcrd, Tarsus, Head, Wt)
Z2
```

### Using the indexes

Suppose you want to access some elements of Z, for instance, the data in the first column. This is done with the command `Z[, 1]`:

```
Z[, 1]
Z[1 : 8, 1]
```

Alternatively, we can use `Z[1 : 8, 1]`. It gives the same result.

The second row is given by `Z [2,]` :

```
Z[2, ]  
Z[2, 1:4]
```

You can assign and extract values, use numerical or logical indices, drop values by using a minus sign. The following commands are all valid.

```
Z[1, 1]  
Z[, 2 : 3]  
Z[4, 4]  
Z[, 4]  
Z[, -3]  
Z[-5, -1]  
Z[, c(1, 3, 4)]  
Z[, c(-1, -3)]
```

Let us noticed, that R doesn't return a matrix in all examples — sometimes it returns a vector.

```
Z[,1]
```

Here because of only one variable's index.

**By default, R always tries to simplify the objects to the smallest number of dimensions possible** when you use the brackets to extract values from an array. So, if you ask for only one column or row, R returns a vector by dropping a dimension.

```
Z[,1,drop=FALSE]
```

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