

Lecture 1 - R Software

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Introduction

Definition: R is a powerful free software program for doing statistics. It can be used for exploring and plotting data, as well as performing statistical tests.

Note: R is not as powerful as a full computer algebra system, having no provision for imaginary numbers or purely algebraic computations. However, it can serve as a calculator.

→ In order to define function, we write command as, `function()`.

For example

```
> sin(pi/2)                                {INPUT}
[1] 1                                        {OUTPUT}
```

where,

[1] implies the item number of the list.

Example:

```
[1] a b c d e
[6] 0 1 2 3 4 5 6 7
[14] u v x y z
[19] ← It indicates the total data entry ends here.
```

Some Basics

- There are three types of data in **R**:
 - ◇ Numeric
 - ◇ Character
 - ◇ Logical.
- **R** supports vectors, matrices, lists and data frames.
- Objects can be assigned values using an equal sign (=) or the special (←) operator.
- All the elements of a matrix or vector must be of the same type.
- A data frame is a cross between a matrix and a list – columns (variables) of a data frame can be of different types, but they all must be the same length.

- Function requires parentheses, even if there are no arguments.

For example: type `q()` to quit **R**.

- Square brackets (`[]`) are used for subscripting, and can be applied to any subscriptable value.

For example:

```
> data1 = c(3, 5, 7, 5, 3, 2, 6, 8, 5, 6, 9)
```

```
> data1
```

```
[1] 3 5 7 5 3 2 6 8 5 6 9
```

```
> data1 [1]    # The first item
```

```
[1] 3
```

```
> data1[1:4]    # The first 4 items
```

```
[1] 3 5 7 5
```

```
> data1[-1]    # All except the first
```

```
[1] 5 7 5 3 2 6 8 5 6 9
```

```
> mymat ← matrix (1 : 30, ncol = 5, dimnames = list(letters[1:6],
LETTERS[1 : 5]))
```

```
> mymat
```

	<i>A</i>	<i>B</i>	<i>C</i>	<i>D</i>	<i>E</i>
<i>a</i>	1	7	13	19	25
<i>b</i>	2	8	14	20	26
<i>c</i>	3	9	15	21	27
<i>d</i>	4	10	16	22	28
<i>e</i>	5	11	17	23	29
<i>f</i>	6	12	18	24	30

```
> mymat[2, 3] # Item from 2nd row and 3rd column
```

```
[1] 14
```

```
> mymat[, 2] # All rows but only 2nd column
```

```
[1]      a      b      c      d      e      f
      7      8      9      10     11     12
```