Descriptive Statistics With R Software

Calculations with R Software

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Built-in Commands and Missing Data Handling

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Built in commands

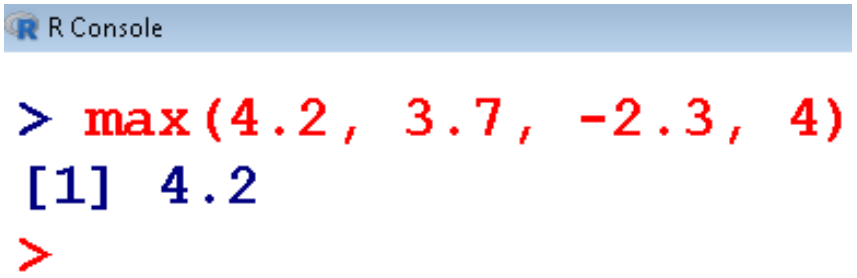
Some commands are readily available in R to compute

mathematical functions.

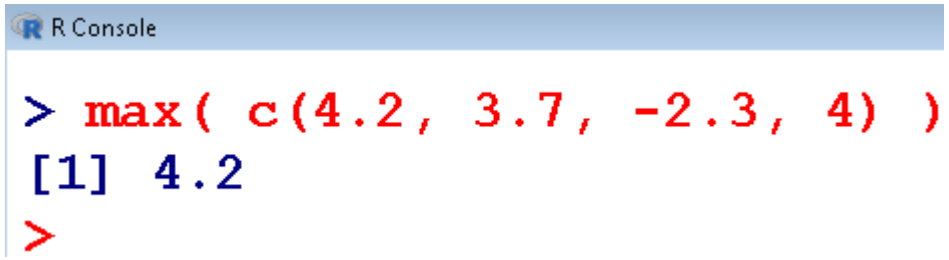
How to use them and utilize them in computing various quantities.

Maximum

```
> max(4.2, 3.7, -2.3, 4)
[1] 4.2
```

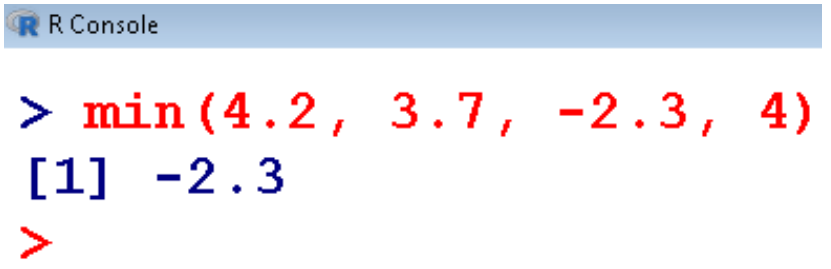



```
> max( c(4.2, 3.7, -2.3, 4) )
[1] 4.2
```

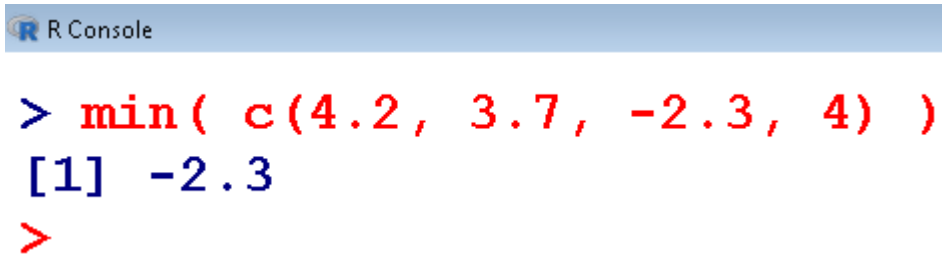


Minimum

```
> min(4.2, 3.7, -2.3, 4)
[1] -2.3
```




```
> min( c(4.2, 3.7, -2.3, 4) )
[1] -2.3
```



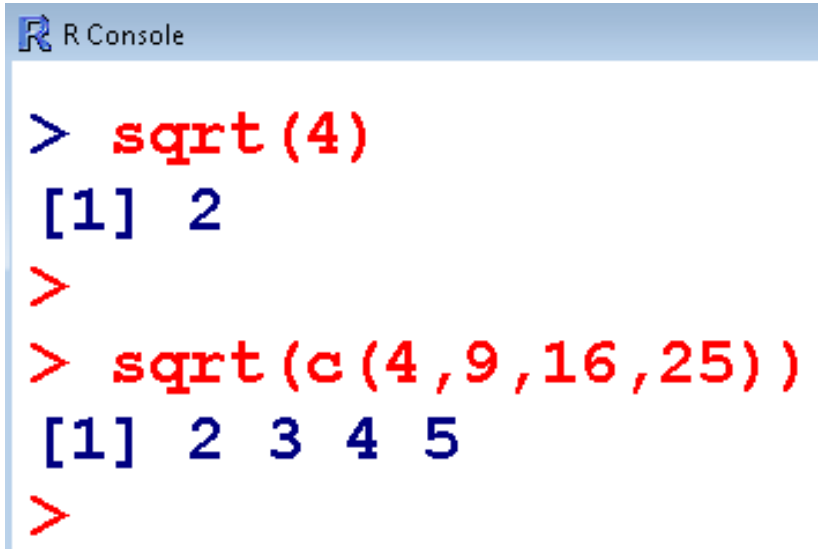
Overview Over Other Functions

`abs()`	Absolute value
`sqrt()`	Square root
`round(), floor(), ceiling()`	Rounding, up and down
`sum(), prod()`	Sum and product
`log(), log10(), log2()`	Logarithms
`exp()`	Exponential function
`sin(), cos(), tan(),` `asin(), acos(), atan()`	Trigonometric functions
`sinh(), cosh(), tanh(),` `asinh(), acosh(), atanh()`	Hyperbolic functions

Examples

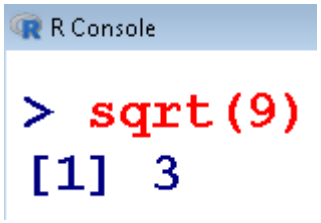
```
> sqrt(4)
[1] 2

> sqrt(c(4,9,16,25))
[1] 2 3 4 5
```

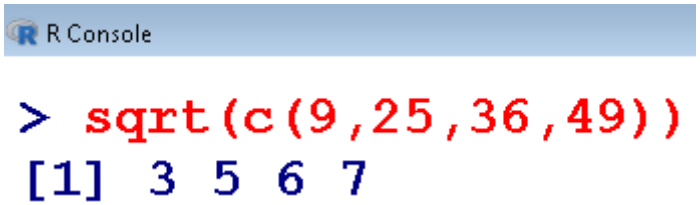


Examples

```
> sqrt(9)
[1] 3
```

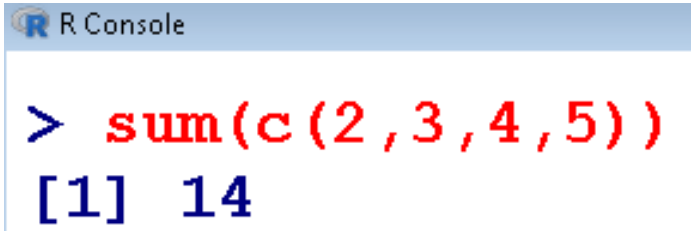



```
> sqrt(c(9,25,36,49))
[1] 3 5 6 7
```

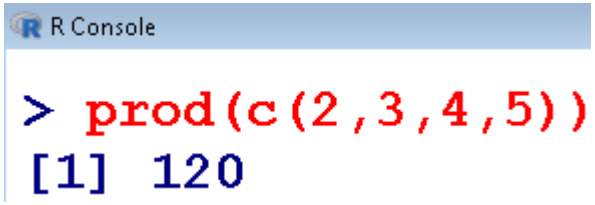


Examples

```
> sum(c(2,3,4,5))
[1] 14
```




```
> prod(c(2,3,4,5))
[1] 120
```



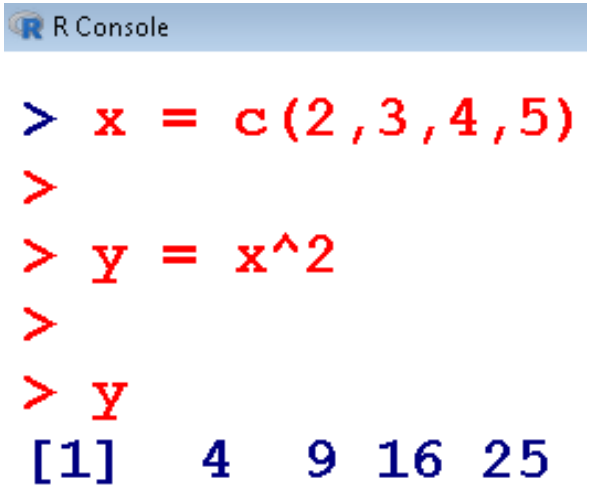
Assignments

An assignment can also be used to save values in variables:

```
> x = c(2,3,4,5)

> y = x^2

> y
[1] 4 9 16 25
```



Examples

To find sum of squares:

```
> x = c(2,3,4,5)
```

$$z = \sum_{i=1}^{n} x_i^2$$

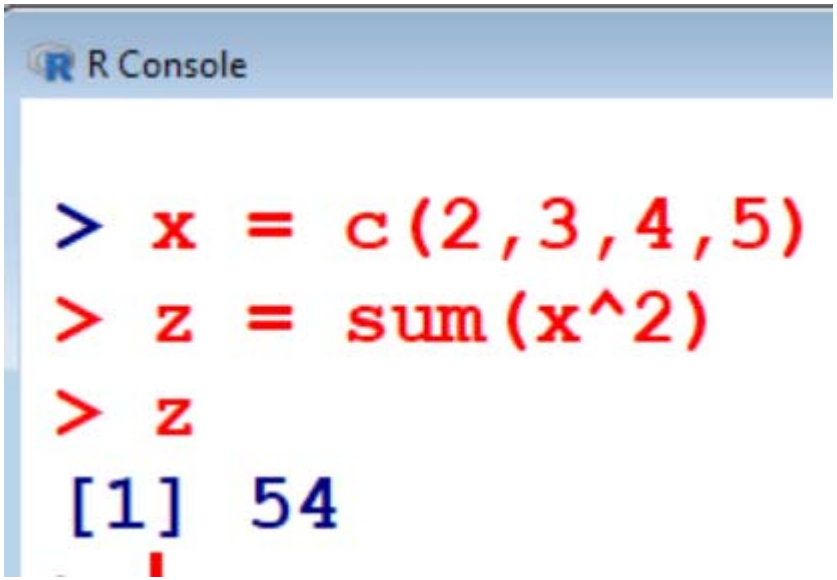
Examples

To find sum of squares:

```
> x = c(2,3,4,5)

> z = sum(x^2)

> z
[1] 54
```



Examples

To find sum of squares of deviation from mean

```
> x = c(2,3,4,5)
```

$$z = \sum_{i=1}^{n} (x_i - \overline{x})^2 = \sum_{i=1}^{n} x_i^2 - n\overline{x}^2$$

Examples

To find sum of squares of deviation from mean

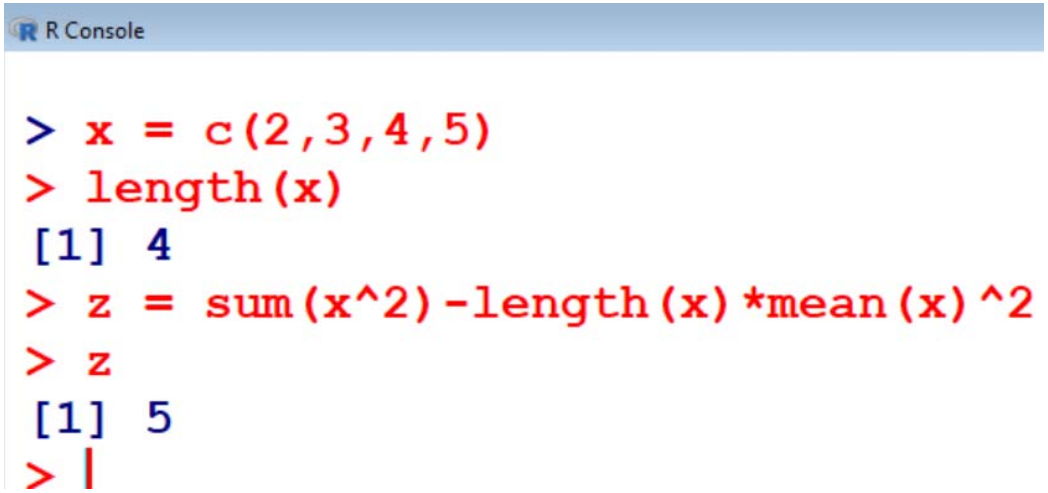
```
> x = c(2,3,4,5)
```

$$z = \sum_{i=1}^{n} (x_i - \overline{x})^2 = \sum_{i=1}^{n} x_i^2 - n\overline{x}^2$$

```
> z = sum(x^2)-length(x)*mean(x)^2

> length(x)
[1] 4

> z
[1] 5
```



Examples

To find sum of cross product:

```
> x1 = c(2,3,4,5)

> x2 = c(6,7,8,9)
```

$$2\times 6+3\times 7+4\times 8+5\times 9$$

```
> z = sum(x1*x2)

> z
[1] 110
```

Missing data

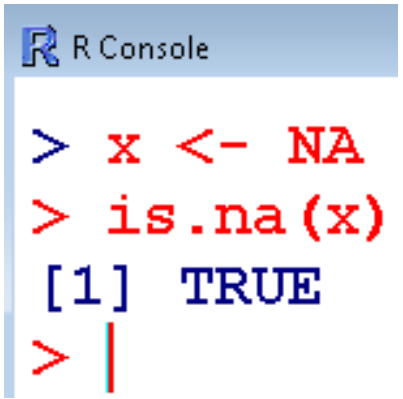
R represents missing observations through the data value **NA**

NA : Reserved word

Missing values can be detected in a data vector by using **is.na**

Create a data with NA.

```
> x <- NA      # assign NA to variable x
> is.na(x)     # is it missing?
 [1] TRUE
```



Missing data

TRUE and FALSE are logical operators that are used to compare expressions.

TRUE and FALSE are reserved words.

T can also be used in place of TRUE .

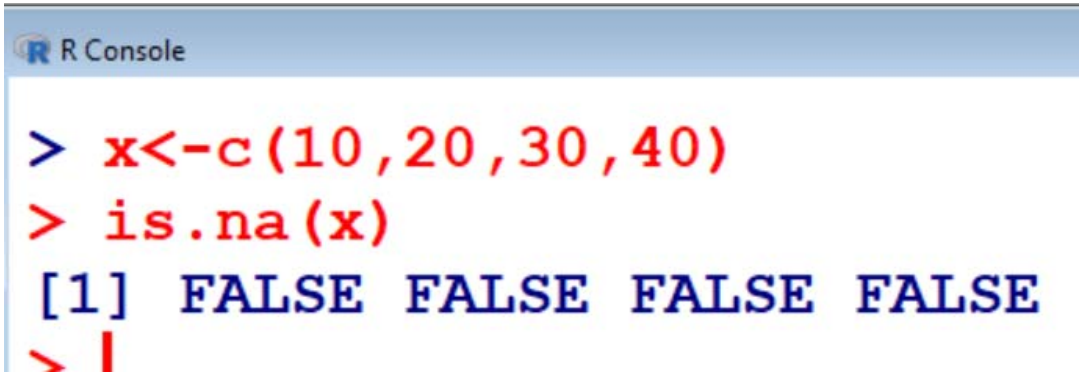
F can also be used in place of FALSE.

TRUE and FALSE are not the same as `true` and `false` respectively.

Missing data

How to know if any value is missing in a data vector?

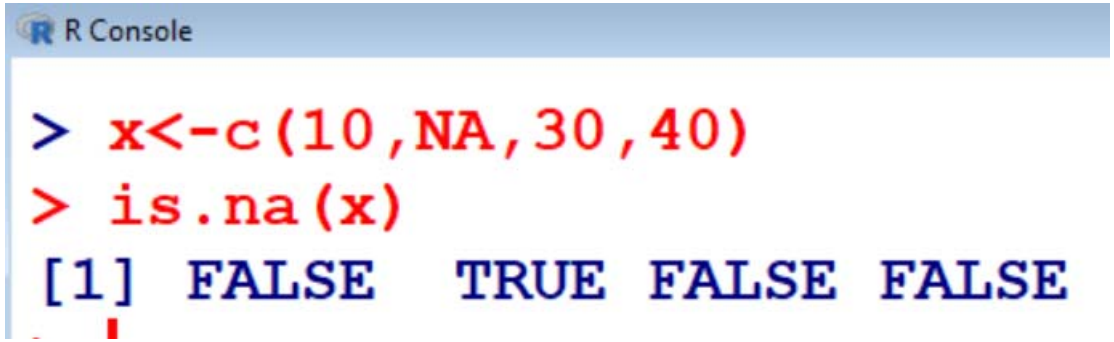
```
> x <- c(10,20,30,40)
> is.na(x)
 [1] FALSE FALSE FALSE FALSE
```



Missing data

How to know if any value is missing in a data vector?

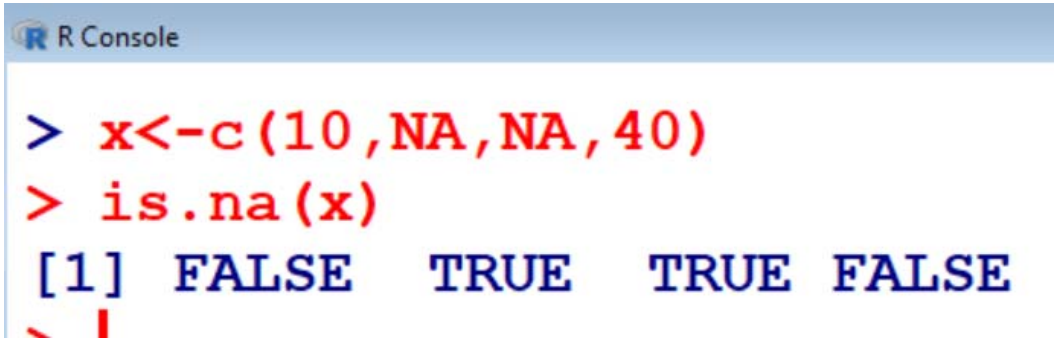
```
> x <- c(10,NA,30,40)
> is.na(x)
 [1] FALSE  TRUE FALSE FALSE
```



Missing data

How to know if any value is missing in a data vector?

```
> x <- c(10,NA,NA,40)
> is.na(x)
 [1] FALSE  TRUE TRUE FALSE
```



Example : How to work with missing data

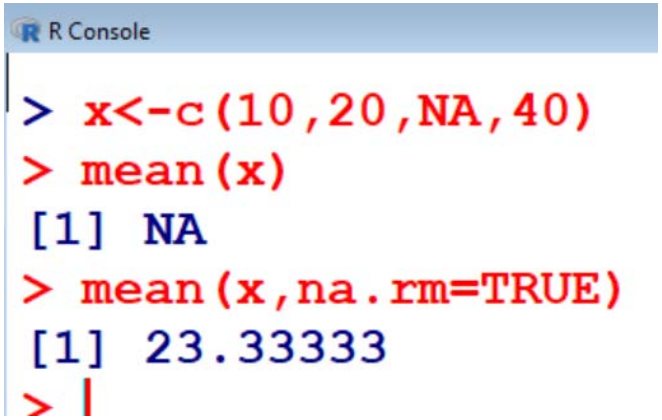
```
> x <- c(10,20,NA,40)
```
 # data vector

```
> mean(x)
 [1] NA
```

$$\frac{10+20+\mathrm{NA}+40}{4}$$

```
> mean(x, na.rm = TRUE)
 [1] 23.33333
```
 # NAs can be removed

$$\frac{10+20+40}{3}=23.33$$



Example : How to work with missing data

The null object, called NULL, is returned by some functions and expressions.

Note that NA and NULL are not the same.

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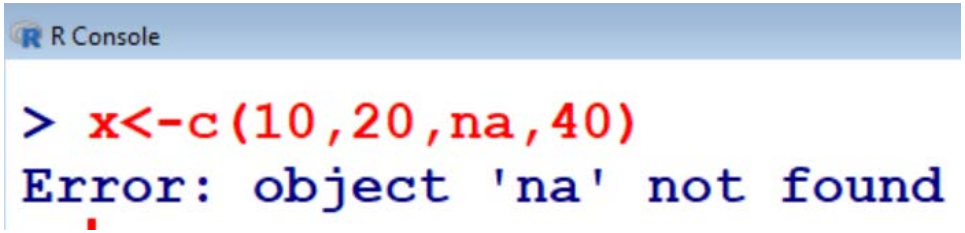

NA is a placeholder for something that exists but is missing.

NULL stands for something that never existed at all.