

Introduction to R Software

Swayam Prabha

Lecture 8

R as Calculator, Built-in Functions and Assignments

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**Slides can be downloaded from
<http://home.iitk.ac.in/~shalab/sp>**

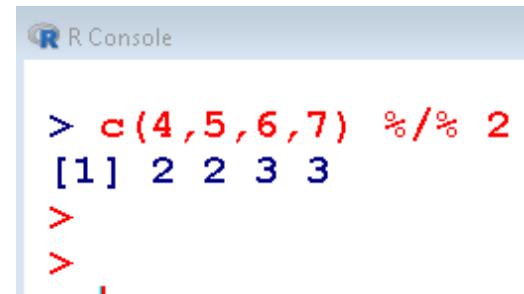


Integer Division %/%

Integer Division: Division in which the fractional part (remainder) is discarded

```
> c(4,5,6,7) %/% 2  
[1] 2 2 3 3
```

4%/%2, 5%/%2, 6%/%2, 7%/%2

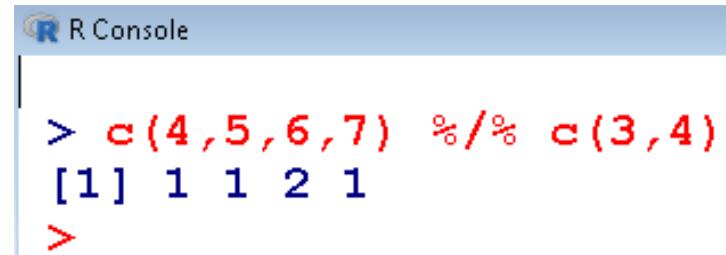


A screenshot of an R console window titled "R Console". The window shows the command `> c(4,5,6,7) %/% 2` followed by the output `[1] 2 2 3 3`. There are two additional lines of code at the bottom: `>` and `> .`, indicating the user has typed more commands.

Integer Division %/%

Integer Division: Division in which the fractional part (remainder) is discarded

```
> c(4,5,6,7) %/% c(3,4)  
[1] 1 1 2 1
```



R Console

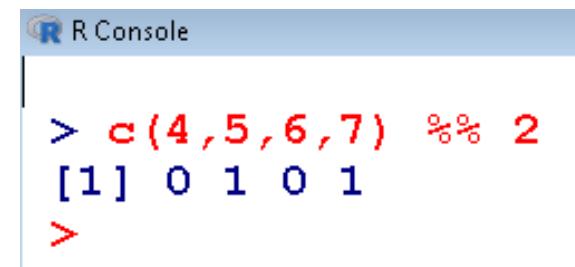
```
> c(4,5,6,7) %/% c(3,4)  
[1] 1 1 2 1  
>
```

4%/%3, 5%/%4, 6%/%3, 7%/%4

Modulo Division (x mod y) %%:

x mod y : modulo operation finds the remainder after division of one number by another

```
> c(4,5,6,7) %% 2  
[1] 0 1 0 1
```



The image shows a screenshot of an R console window titled "R Console". It displays the command `> c(4,5,6,7) %% 2` in red, followed by the output `[1] 0 1 0 1` in blue, and a red greater-than sign prompt `>`.

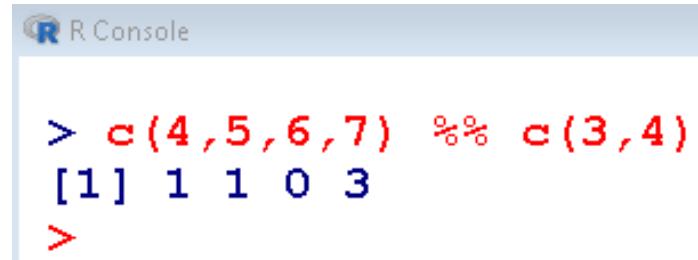
4%%2, 5%%2, 6%%2, 7%%2

Modulo Division (x mod y) : %%

x mod y : modulo operation finds the remainder after division
of one number by another

```
> c(4,5,6,7) %% c(3,4)  
[1] 1 1 0 3
```

4%%3, 5%%4, 6%%3, 7%%4



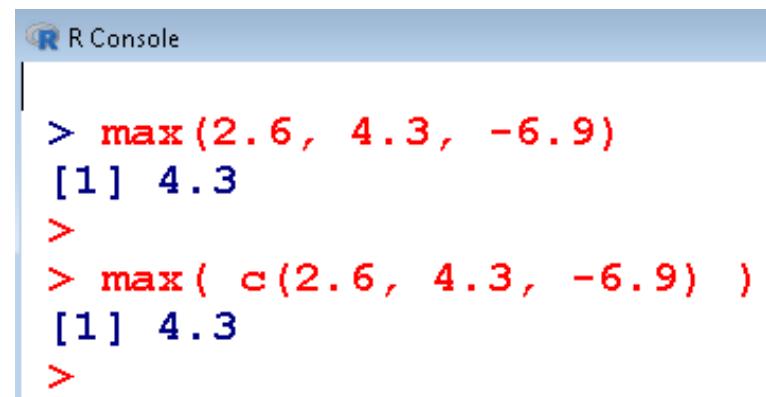
```
R Console  
> c(4,5,6,7) %% c(3,4)  
[1] 1 1 0 3  
>
```

Maximum: max

```
> max(2.6, 4.3, -6.9)
```

```
[1] 4.3
```

```
> max( c(2.6, 4.3, -6.9) )  
[1] 4.3
```



A screenshot of an R console window titled "R Console". The window shows the following interaction:

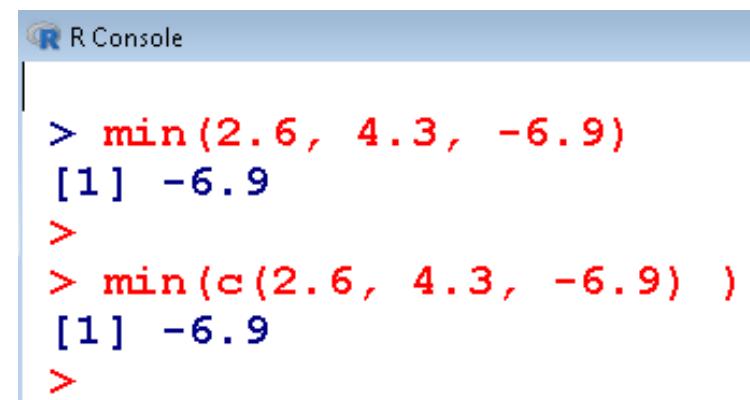
```
R Console  
> max(2.6, 4.3, -6.9)  
[1] 4.3  
>  
> max( c(2.6, 4.3, -6.9) )  
[1] 4.3  
>
```

Minimum : min

```
> min(2.6, 4.3, -6.9)
```

```
[1] -6.9
```

```
> min(c(2.6, 4.3, -6.9) )  
[1] -6.9
```



The screenshot shows the R console interface. The title bar says "R Console". The main area contains the following R code and its output:

```
R Console  
> min(2.6, 4.3, -6.9)  
[1] -6.9  
>  
> min(c(2.6, 4.3, -6.9) )  
[1] -6.9  
>
```

Overview Over Further 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

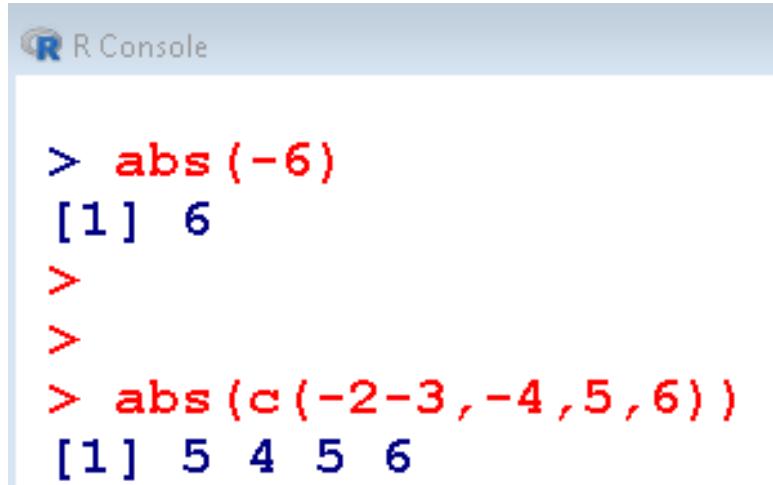
Examples

```
> abs(-6)
```

```
[1] 6
```

```
> abs(c(-2-3,-4,5,6))
```

```
[1] 5 4 5 6
```



The image shows a screenshot of an R console window. The title bar says "R Console". The main area contains the following R code and its output:

```
> abs(-6)
[1] 6
>
>
> abs(c(-2-3,-4,5,6))
[1] 5 4 5 6
```

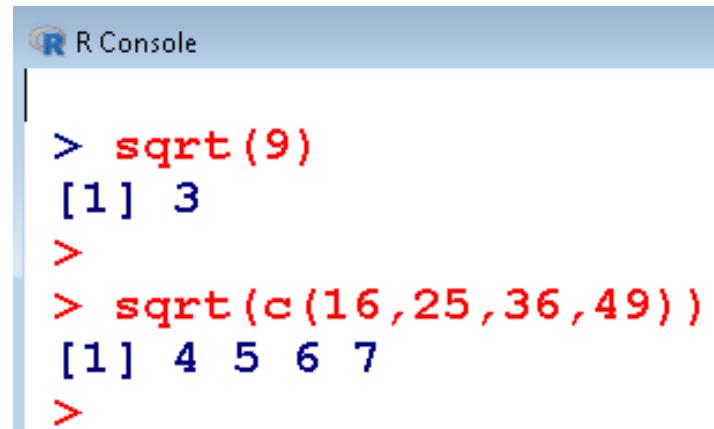
Examples

```
> sqrt(9)
```

```
[1] 3
```

```
> sqrt(c(16,25,36,49))
```

```
[1] 4 5 6 7
```

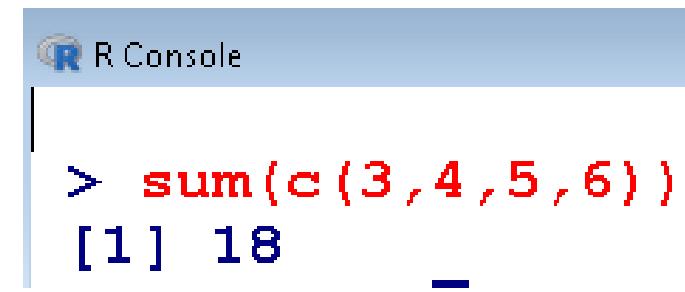


A screenshot of an R console window titled "R Console". The window shows the following R code and its output:

```
> sqrt(9)
[1] 3
>
> sqrt(c(16,25,36,49))
[1] 4 5 6 7
>
```

Examples

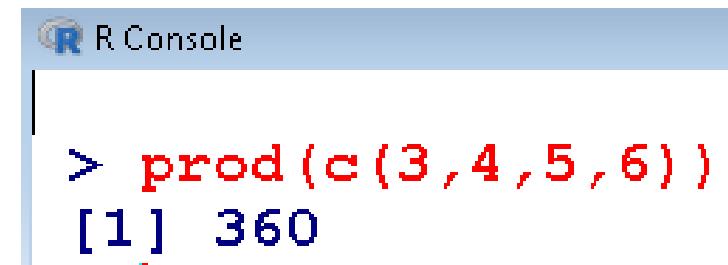
```
> sum(c(3,4,5,6))  
[1] 18
```



R Console

```
> sum(c(3,4,5,6))  
[1] 18
```

```
> prod(c(3,4,5,6))  
[1] 360
```



R Console

```
> prod(c(3,4,5,6))  
[1] 360
```

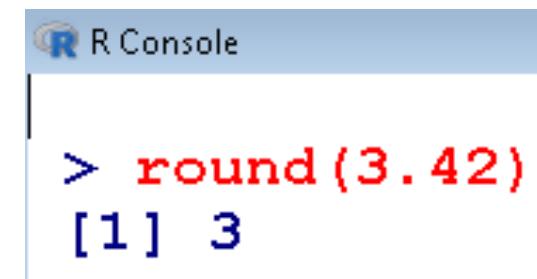
Examples

```
> round(3.42)
```

```
[1] 3
```

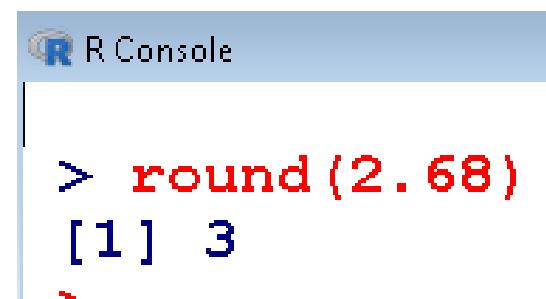
```
> round(2.68)
```

```
[1] 3
```



A screenshot of an R console window titled "R Console". It displays the command "round(3.42)" in red and its output "[1] 3" in blue. The console has a light gray background with a dark blue header bar.

```
R Console
> round(3.42)
[1] 3
```



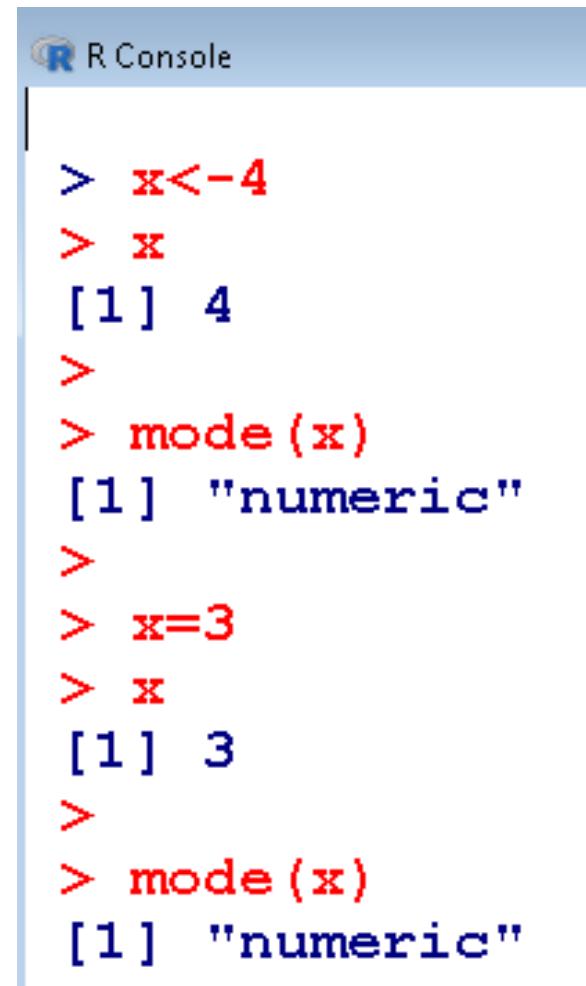
A screenshot of an R console window titled "R Console". It displays the command "round(2.68)" in red and its output "[1] 3" in blue. A red cursor arrow is visible at the bottom of the console window. The console has a light gray background with a dark blue header bar.

```
R Console
> round(2.68)
[1] 3
```

Assignments

Assignments can be made in two ways:

```
> x<-4  
> x  
[1] 4  
  
> mode(x)  
[1] "numeric"  
  
> x=3  
> x  
[1] 3  
  
> mode(x)  
[1] "numeric"
```



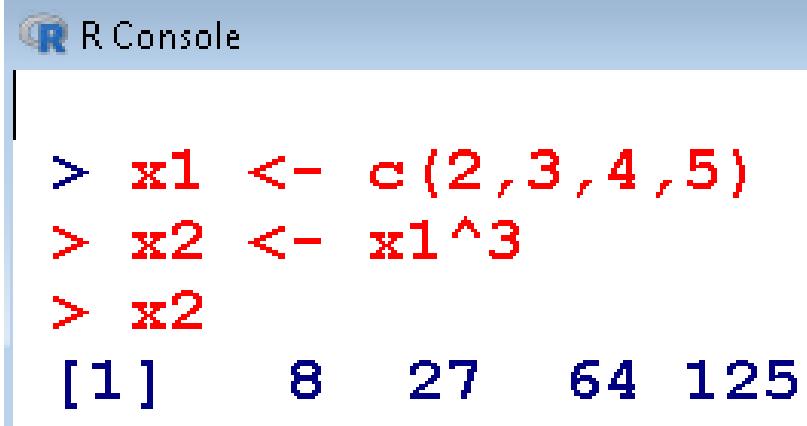
A screenshot of the R Console window. The title bar says "R Console". The console area contains the following R session history:

```
> x<-4  
> x  
[1] 4  
>  
> mode(x)  
[1] "numeric"  
>  
> x=3  
> x  
[1] 3  
>  
> mode(x)  
[1] "numeric"
```

Assignments

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

```
> x1 <- c(2,3,4,5)  
  
> x2 <- x1^3  
  
> x2  
[1] 8   27   64  125
```



The screenshot shows the R Console interface. The title bar says "R Console". The console window contains the following text:
> x1 <- c(2,3,4,5)
> x2 <- x1^3
> x2
[1] 8 27 64 125

ATTENTION: R is case sensitive (X is not the same as x)