

Introduction to R Software

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Lecture 7

R as a Calculator with Data Vectors

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

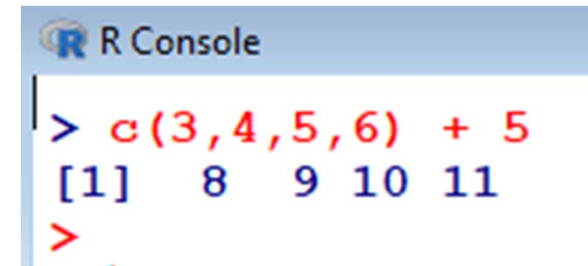


Addition and Subtraction in data vector:

$x + y$, $x - y$

```
> c(3,4,5,6) + 5  
[1] 8 9 10 11
```

3+5, 4+5, 5+5, 6+5



```
R Console  
> c(3,4,5,6) + 5  
[1] 8 9 10 11  
>
```

Addition and Subtraction in data vector:

$x + y$, $x - y$

```
> c(3, 4, 5, 6) + c(-3, -4, -5, 7)
```

```
[1] 0 0 0 13
```

$3+(-3), 4+(-4), 5+(-5), 6+7$

R Console

```
> > c(3,4,5,6) + c(-3,-4, -5, 7)  
[1] 0 0 0 13  
>
```

Addition and Subtraction in data vector:

$x + y$, $x - y$

```
> c(3,4,5,6) + c(7,8) # !!! ATTENTION!
```

```
[1] 10 12 12 14
```

3+7, 4+8, 5+7, 6+8

R Console

```
> c(3,4,5,6) + c(7,8)
[1] 10 12 12 14
>
```

Addition and Subtraction in data vector:

$x + y$, $x - y$

```
> c(3,4,5,6) + c(7,8,9) # Warning message
```

```
[1] 10 12 14 13
```

Warning message:

```
In: c(3, 4, 5, 6) + c(7, 8, 9)
```

```
longer object length is not a multiple of
```

```
shorter object length
```

```
3+7, 4+8, 5+9, 6+7
```

Addition and Subtraction in data vector:

$x + y$, $x - y$

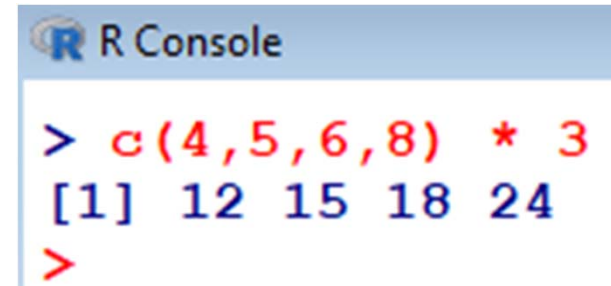
R Console

```
> c(3,4,5,6) + c(7,8,9)
[1] 10 12 14 13
Warning message:
In c(3, 4, 5, 6) + c(7, 8, 9) :
  longer object length is not a multiple of shorter object length
>
```

Multiplication in data vector: $x * y$

```
> c(4,5,6,8) * 3  
[1] 12 15 18 24
```

4 x 3, 5 x 3, 6 x 3, 8 x 3



```
R Console  
> c(4,5,6,8) * 3  
[1] 12 15 18 24  
>
```

Multiplication in data vector: $x * y$

```
> c(3,4,5,6) * c(-3,-4,-5,7)
```

```
[1] -9 -16 -25 42
```

3 x (-3), 4 x (-4), 5 x (-5), 6 x 7

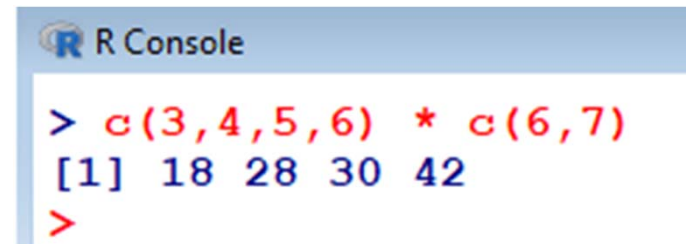
```
R Console  
> c(3,4,5,6) * c(-3,-4,-5,7)  
[1] -9 -16 -25 42  
>
```


Multiplication in data vector: $x * y$

```
> c(3,4,5,6) * c(6,7) # !!! ATTENTION
```

```
[1] 18 28 30 42
```

3 x 6, 4 x 7, 5 x 6, 6 x 7



```
R Console  
> c(3,4,5,6) * c(6,7)  
[1] 18 28 30 42  
>
```

Multiplication in data vector: $x * y$

```
> c(3,4,5,6) * c(7,8,9) # Warning message
```

```
[1] 21 32 45 42
```

```
Warning message:
```

```
In c(3, 4, 5, 6) * c(7, 8, 9)
```

```
longer object length
```

```
is not a multiple of shorter object length
```

3 x 7, 4 x 8, 5 x 9, 6 x 7

Multiplication in data vector: $x * y$

R Console

```
> c(3,4,5,6) * c(7,8,9)
[1] 21 32 45 42
Warning message:
In c(3, 4, 5, 6) * c(7, 8, 9) :
  longer object length is not a multiple of shorter object length
> |
```

Division in data vector: x / y

```
> c(2,4,6,8) / 2
```

```
[1] 1 2 3 4
```

$2 / 2, 4 / 2, 6 / 2, 8 / 2$

```
> c(2,4,6,8) / 4
```

```
[1] 0.5 1.0 1.5 2.0
```

$2 / 4, 4 / 4, 6 / 4, 8 / 4$

```
R Console
> c(2,4,6,8) / 2
[1] 1 2 3 4
>
> c(2,4,6,8) / 4
[1] 0.5 1.0 1.5 2.0
>
> |
```

Division in data vector: x / y

```
> c(4,8,12,16) / c(-2,-4,-3,8)
```

```
[1] -2 -2 -4 2
```

$4 / (-2), 8 / (-4), 12 / (-3), 16 / 8$

```
R Console  
> c(4,8,12,16) / c(-2,-4,-3,8)  
[1] -2 -2 -4 2  
> |
```

Division in data vector: x / y

```
> c(4,8,12,16) / c(3,4,5,6)
```

```
[1] 1.333333 2.000000 2.400000 2.666667
```

$4 / 3, 8 / 4, 12 / 5, 16 / 6$

```
R Console  
> c(4,8,12,16) / c(3,4,5,6)  
[1] 1.333333 2.000000 2.400000 2.666667  
> |
```

Division in data vector: x / y

```
> c(4,8,12,16) / c(2,4,3) # Warning message  
[1] 2 2 4 8
```

Warning message:

```
In c(4, 8, 12, 16)/c(2, 4, 3) :
```

```
  longer object length is not a multiple of  
shorter object length
```

$4 / 2, 8 / 4, 12 / 3, 16 / 2$

Division in data vector: x / y

R Console

```
> c(3,4,5,6) * c(7,8,9)
```

```
[1] 21 32 45 42
```

```
Warning message:
```

```
In c(3, 4, 5, 6) * c(7, 8, 9) :
```

```
  longer object length is not a multiple of shorter object length
```

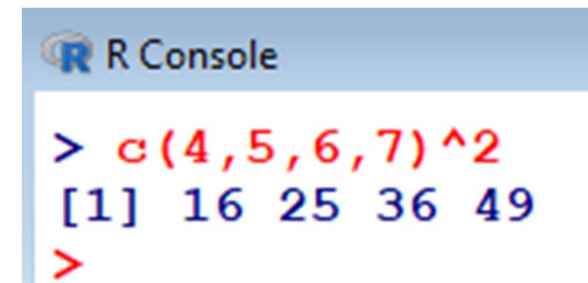
```
> |
```


Power operator with data vector

```
> c(4,5,6,7)^2 #command: application to  
a vector
```

```
[1] 16 25 36 49 # output
```

$4^2, 5^2, 6^2, 7^2$



```
R Console  
> c(4,5,6,7)^2  
[1] 16 25 36 49  
>
```

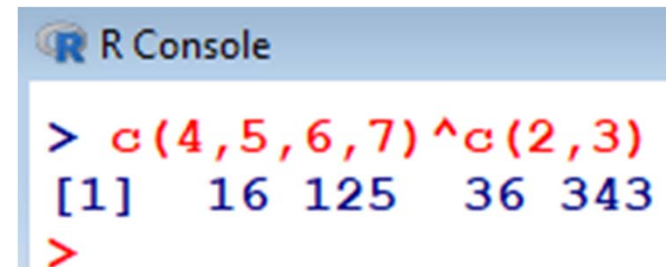
Power operator with data vector

```
> c(4,5,6,7)^c(2,3) # !!ATTENTION!
```

Observe the operation

```
[1] 16 125 36 343 # output
```

$4^2, 5^3, 6^2, 7^3$

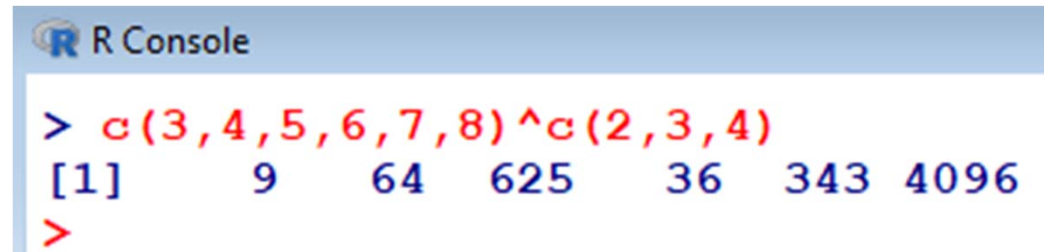


```
R Console  
> c(4,5,6,7)^c(2,3)  
[1] 16 125 36 343  
>
```

Power operator with data vector

```
> c(3,4,5,6,7,8)^c(2,3,4) # command:  
application to a vector  
with vector  
  
[1] 9 64 625 36 343 4096 # output
```

$3^2, 4^3, 5^4, 6^2, 7^3, 8^4$



```
R Console  
> c(3,4,5,6,7,8)^c(2,3,4)  
[1] 9 64 625 36 343 4096  
>
```

Power operator with data vector

```
> c(2,4,6,7)^c(2,3,4)      # Warning message  
[1] 4  64 1296  49      # output
```

Warning message:

```
longer object length is not a multiple of  
shorter object length in: c(2,3,5,7)^c(2,3,4)
```

$2^2, 4^3, 6^4, 7^2$

Power operator with data vector

R Console

```
> c(2,4,6,7)^c(2,3,4)
[1] 4 64 1296 49
Warning message:
In c(2, 4, 6, 7)^c(2, 3, 4) :
  longer object length is not a multiple of shorter object length
> .
```