Introduction to R software
- Calculations with Data Vectors

Calculations with Data Vectors

- How does R behave with data vectors?

  What happens when a **scalar** is added/subtracted/multiplied/divided

  to a **data vector**?

- What happens when a **data vector** is added/subtracted/multiplied/ divided

  to a **data vector**?

Addition with vector versus scalar

```
> c(2,3,4,5) + 20
[1]  22 23 24 25
```

$$2+20, \quad 3+20, \quad 4+20, \quad 5+20$$

Addition with vector versus vector

```
> c(1,2,3,4) + c(2,3,4,5)
[1] 3 5 7 9
```

1+2, 2+3, 3+4, 4+5

Addition with vector versus vector

```
> c(2,3,4,5) + c(6,7,8) # error message
[1]  8 10 12 11
Warning message:
In c(2, 3, 4, 5) + c(6, 7, 8) :
  longer object length is not a multiple of
shorter object length
```

$$2+6, \quad 3+7, \quad 4+8, \quad 5+6$$

Multiplication with vector versus scalar

```
> c(2,3,4,5) * 6
[1] 12 18 24 30
```

$$2 \times 6, \ 3 \times 6, \ 4 \times 6, \ 5 \times 6$$

Multiplication with vector versus vector

```
> c(2,3,4,5) * c(6,7)
[1] 12 21 24 35
```

$$2 \times 6, \quad 3 \times 7, \quad 4 \times 6, \quad 5 \times 7$$

Multiplication with vector versus vector

```
> c(2,3,4,5) * c(-2,-3,-4,6)
[1]  -4   -9 -16   30
```

$$2\times(-2),\ 3\times(-3),\ 4\times(-4),\ 5\times6$$

Multiplication with vector versus vector

```
> c(2,3,4,5) * c(6,7,8) # error message
[1] 12 21 32 30
 Warning message:
In c(2,3,4,5) * c(6,7,8) :longer object length
is not a multiple of shorter object length
```

$$2 \times 6, \quad 3 \times 7, \quad 4 \times 8, \quad 5 \times 6$$

Division with vector versus scalar

```
> c(10,20,30,40) / 5
[1] 2 4 6 8
```

10/5, 20/5, 30/5, 40/5

Division with vector versus vector

```
> c(10,20,30,40) / c(5, 10)
[1] 2 2 6 4
```

10/5, 20/10, 30/5, 40/10

Power operators with vector versus scalar

```
> c(3,4,5,6)^2      # command: application to a
                                  vector

[1] 9 16 25 36      # output
```

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

Power operators with vector versus vector

```
> c(3,4,5,6)^c(2,3)    # !!ATTENTION! Observe the
                         #   operation
[1]   9 64 25 216        # output
```

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

Power operators with vector versus vector

```
> c(1,2,3,4,5,6)^c(2,3,4)   # command: application
                                 to a vector with vector
 [1]    1 8 81 16 125 1296     # output
```

$$1^2, \ 2^3, \ 3^4, \ 4^2, \ 5^3, \ 6^4$$

Power operators with vector versus vector

```
> c(2,3,4,5)^c(3,4,5)          #error message
[1] 8 81 1024 125              # output
Warning message:
In c(2,3,4,5)^c(3,4,5) :longer object length is
not a multiple of shorter object length
```

$$2^3, \ 3^4, \ 4^5, \ 5^3$$