

(slightly) advanced R programming

Relational and conditional operators

Resources for R programming

- R intro <https://cran.r-project.org/doc/manuals/R-intro.pdf>
- Stack overflow <https://stackoverflow.com/>
- Highland Stats <http://www.highstat.com/>
- Datacamp <https://www.datacamp.com/>
- Coursera <https://www.coursera.org/>
- Alexander Keth <https://github.com/alketh>

Relational operators

- How does one thing (in R: *object*) relate to another?

Relational operators: Equality

- How does one thing (in R: *object*) relate to another?
- Are they the same? `> ==`
- Output will be TRUE or FALSE.

```
> 4 == 12 / 3
```

```
[1] TRUE
```

```
> 3 * 3 == 4
```

```
[1] FALSE
```

Relational operators: Equality

- Equality can also be enquired for logical or character objects:

```
> TRUE == TRUE
```

```
[1] TRUE
```

```
> "winter" == "summer"
```

```
[1] FALSE
```

Relational operators: Inequality

- Are two objects NOT the same?

- R operator: `> !=`

```
> 4 != 12 / 3
```

```
[1] FALSE
```

```
> 3 * 3 != 4
```

```
[1] TRUE
```

- Also works with logicals and characters:

```
> "winter" != "summer"
```

```
[1] TRUE
```

```
> TRUE != TRUE
```

```
[1] FALSE
```

Relational operators: greater or smaller than

- R operators: > or <

```
> 12 < 23
```

```
[1] TRUE
```

```
> 12 < 9
```

```
[1] FALSE
```

```
> 12 > 9
```

```
[1] TRUE
```

Relational operators: greater or smaller than

- R operators: > or <

```
> 12 < 23
```

```
[1] TRUE
```

```
> 12 < 9
```

```
[1] FALSE
```

```
> 12 > 9
```

```
[1] TRUE
```

- Also works on characters...

```
> "my_yacht" > "your_yacht"
```

```
[1] FALSE
```

..since 'm' is further down the alphabet than 'y'

- ...and logical objects

```
> TRUE > FALSE
```

```
[1] TRUE
```

TRUE is a computational 1;
FALSE is a 0

- Greater or equal: >=
- Smaller or equal: <=

Relational operators work on vectors

- A vector of counts of tiger sharks counts...

```
> tiger <- c(0, 4, 1, 1, 4, 5, 2, 0, 9)
```

- On which days were there tiger sharks in the water?

```
> tiger > 0
```

```
[1] FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
```

- ...or:

```
> tiger >= 1
```

```
[1] FALSE TRUE TRUE TRUE TRUE TRUE TRUE FALSE TRUE
```

Relational operators work on vectors

- A vector of counts of tiger sharks counts...

```
> tiger <- c(0, 4, 1, 1, 4, 5, 2, 0, 9)
```

- ... and of hammerhead sharks:

```
> hammerheads <- c(1, 2, 4, 5, 2, 0, 1, 1, 4)
```

- When were there more tiger than hammerhead sharks?

```
> tiger > hammerheads
```

```
[1] FALSE TRUE FALSE FALSE TRUE TRUE TRUE FALSE TRUE
```

Exercise 01 and 02



Logical operators

- AND operator: &
- OR operator: |
- NOT operator: !

Logical operators

- AND operator: & Returns TRUE if both statements are TRUE.
 > 12 < 23 & 12 > 5
 [1] TRUE
- OR operator: | One of the logical values must evaluate to TRUE.
 > 12 < 23 & 12 < 5
 [1] FALSE
 > 12 < 23 | 12 < 5
 [1] TRUE
- NOT operator: ! > !TRUE > !(12 > 5) > !is.numeric("winter")
 [1] FALSE [1] FALSE [1] TRUE

Exercises 3 and 4

