# Equality

The most basic form of comparison is equality. Let's briefly recap its syntax. The following statements all evaluate to TRUE (feel free to try them out in the console).

3 == (2 + 1)

"intermediate" != "r"

TRUE != FALSE

"Rchitect" != "rchitect"

Notice from the last expression that R is case sensitive: "R" is not equal to "r". Keep this in mind when solving the exercises in this chapter!

##### Instructions

* In the editor on the right, write R code to see if TRUE equals FALSE.
* Likewise, check if -6 \* 14 is not equal to 17 - 101.
* Next up: comparison of character strings. Ask R whether the strings "useR" and "user" are equal.
* Finally, find out what happens if you compare logicals to numerics: are TRUE and 1 equal?

# Greater and less than

Apart from equality operators, Filip also introduced the less than and greater than operators: < and >. You can also add an equal sign to express less than or equal to or greater than or equal to, respectively. Have a look at the following R expressions, that all evaluate to FALSE:

(1 + 2) > 4

"dog" < "Cats"

TRUE <= FALSE

Remember that for string comparison, R determines the greater than relationship based on alphabetical order. Also, keep in mind that TRUE is treated as 1 for arithmetic, and FALSE is treated as 0. Therefore, FALSE < TRUE is TRUE.

##### Instructions

Write R expressions to check whether:

* -6 \* 5 + 2 is greater than or equal to -10 + 1.
* TRUE is greater than FALSE.

# Compare vectors

You are already aware that R is very good with vectors. Without having to change anything about the syntax, R's relational operators also work on vectors.

You want to figure out whether your activity on social media platforms have paid off and decide to look at your results for LinkedIn and Facebook. The sample code in the editor initializes the vectors linkedin and facebook. Each of the vectors contains the number of profile views your LinkedIn and Facebook profiles had over the last seven days.

##### Instructions

Using relational operators, find a logical answer, i.e. TRUE or FALSE, for the following questions:

* On which days did the number of LinkedIn profile views exceed 15?
* When was your LinkedIn profile viewed only 5 times or fewer?
* When was your LinkedIn profile visited more often than your Facebook profile?

# Compare matrices

R's ability to deal with different data structures for comparisons does not stop at vectors. Matrices and relational operators also work together seamlessly!

Instead of in vectors (as in the previous exercise), the LinkedIn and Facebook data is now stored in a matrix called views. The first row contains the LinkedIn information; the second row the Facebook information. The original vectors facebook and linkedin are still available as well.

##### Instructions

Using the relational operators you've learned so far, try to discover the following:

* When were the views exactly equal to 13? Use the views matrix to return a logical matrix.
* For which days were the number of views less than or equal to 14? Again, have R return a logical matrix.

# & and |

Before you work your way through the next exercises, have a look at the following R expressions. All of them will evaluate to TRUE:

TRUE & TRUE

FALSE | TRUE

5 <= 5 & 2 < 3

3 < 4 | 7 < 6

Watch out: 3 < x < 7 to check if x is between 3 and 7 will not work; you'll need 3 < x & x < 7 for that.

In this exercise, you'll be working with the last variable. This variable equals the last value of the linkedin vector that you've worked with previously. The linkedin vector represents the number of LinkedIn views your profile had in the last seven days, remember? Both the variables linkedin and last have already been defined in the editor.

##### Instructions

Write R expressions to solve the following questions concerning the variable last:

* Is last under 5 or above 10?
* Is last between 15 and 20, excluding 15 but including 20?

# & and | (2)

Like relational operators, logical operators work perfectly fine with vectors and matrices.

Both the vectors linkedin and facebook are available again. Also a matrix - views - has been defined; its first and second row correspond to the linkedin and facebook vectors, respectively. Ready for some advanced queries to gain more insights into your social outreach?

##### Instructions

* When did LinkedIn views exceed 10 and did Facebook views fail to reach 10 for a particular day? Use the linkedin and facebook vectors.
* When were one or both of your LinkedIn and Facebook profiles visited at least 12 times?
* When is the views matrix equal to a number between 11 and 14, excluding 11 and including 14?

# The if statement

Before diving into some exercises on the if statement, have another look at its syntax:

if (condition) {

expr

}

Remember your vectors with social profile views? Let's look at it from another angle. The medium variable gives information about the social website; the num\_views variable denotes the actual number of views that particular medium had on the last day of your recordings. Both these variables have already been defined in the editor.

##### Instructions

* See and Examine the if statement that prints out "Showing LinkedIn information" if the medium variable equals "LinkedIn".
* Code an if statement that prints "You are popular!" to the console if the num\_views variable exceeds 15.

# Add an else

You can only use an else statement in combination with an if statement. The else statement does not require a condition; its corresponding code is simply run if all of the preceding conditions in the control structure are FALSE. Here's a recipe for its usage:

if (condition) {

expr1

} else {

expr2

}

It's important that the *else* keyword comes on the same line as the closing bracket of the *if* part!

Both if statements that you coded in the previous exercises are already available in the editor. It's now up to you to extend them with the appropriate else statements!

##### Instructions

Add an else statement to both control structures, such that

* "Unknown medium" gets printed out to the console when the if-condition on medium does not hold.
* R prints out "Try to be more visible!" when the if-condition on num\_views is not met.

# Customize further: else if

The else if statement allows you to further customize your control structure. You can add as many else if statements as you like. Keep in mind that R ignores the remainder of the control structure once a condition has been found that is TRUE and the corresponding expressions have been executed. Here's an overview of the syntax to freshen your memory:

if (condition1) {

expr1

} else if (condition2) {

expr2

} else if (condition3) {

expr3

} else {

expr4

}

Again, It's important that the *else if* keywords comes on the same line as the closing bracket of the previous part of the control construct!

##### Instructions

Add code to both control structures such that:

* R prints out "Showing Facebook information" if medium is equal to "Facebook". Remember that R is case sensitive!
* "Your number of views is average" is printed if num\_views is between 15 (inclusive) and 10 (exclusive). Feel free to change the variables medium and num\_views to see how the control structure respond. In both cases, the existing code should be extended in the else if statement. No existing code should be modified.