

# Problem Set 1

Introduction to R | University of Oxford Sociology

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## Problem Set 1

Complete the following questions in R within a Quarto document.

### Exercise 1: Assignment, Arithmetic, Logical Expressions

- 1.1 Assign `x` and `y` to take values 3 and 4.
- 1.2 Assign `z` as the product of `x` and `y`.
- 1.3 Calculate the square of 3 and assign it to `three_squared`.
- 1.4 Write a logical expression to check if `three_squared` is greater than 10.
- 1.5 Write a logical expression to test whether `three_squared` is *not* greater than 10. Use the negate (`!`) operator.

### Exercise 2: Sequencing

- 2.1 Generate vectors containing the numbers 100, 101, 102, 103, 104, and 105 using 3 different methods (e.g., `c()`, `seq()`, `:`). In what scenarios might each method be most convenient?
- 2.2 Generate a sequence of all even numbers between 0 and 100. Use the `seq()` function.
- 2.3 Create a descending sequence from 100 to 1 and assign it to a variable. Use the `seq()` function.

### Exercise 3: Data Generation and Basic Statistical Analysis

3.1 Generate a sample of 100 observations from a normal distribution with a mean of 10 and a standard deviation of 2. Use the `rnorm()` function.

3.2 What are the 1st, 10th, and 100th elements of this **vector**?

3.3 Calculate the mean of this **vector**. How does this **sample** mean relate to the **population** mean (hint: population mean = 10) of the distribution?

3.4 Calculate the difference between the **sample** mean and the **population** mean. Discuss the reason for the discrepancy.

3.5 Repeat steps 1 and 3 with a sample size of 10,000. Did the difference between the sample mean and the population mean decrease? Why?