

# 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.

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### 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.

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## 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.

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## 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?