

Code Sleuth

Instructions

This exercise challenges you to figure out how R categorizes and combines data of different types.

- First, you'll see tables with code examples and their outputs. Use *these* to infer how R categorizes and combines types.
- Then, use your inferences to predict what the outputs will be for the subsequent code examples.

For this exercise, assume the following code has run first:

```
bird_species <- c("California Towhee", "House Finch", "House Sparrow")
bird_counts <- c(9L, 6L, 8L)
song_freq_khz <- c(4.99, 2.66, 4.08)
is_native <- c(TRUE, TRUE, FALSE)
```

Atomic types

Inference

Code example	Output
<code>typeof(bird_species)</code>	[1] "character"
<code>typeof(bird_counts)</code>	[1] "integer"
<code>typeof(song_freq_khz)</code>	[1] "double"
<code>typeof(is_native)</code>	[1] "logical"

What do the four **atomic types** represent?

character **text**

integer **“whole” numbers**

double **decimal numbers**

logical **boolean logic (true, false)**

Prediction

What will be the output of the following expressions?

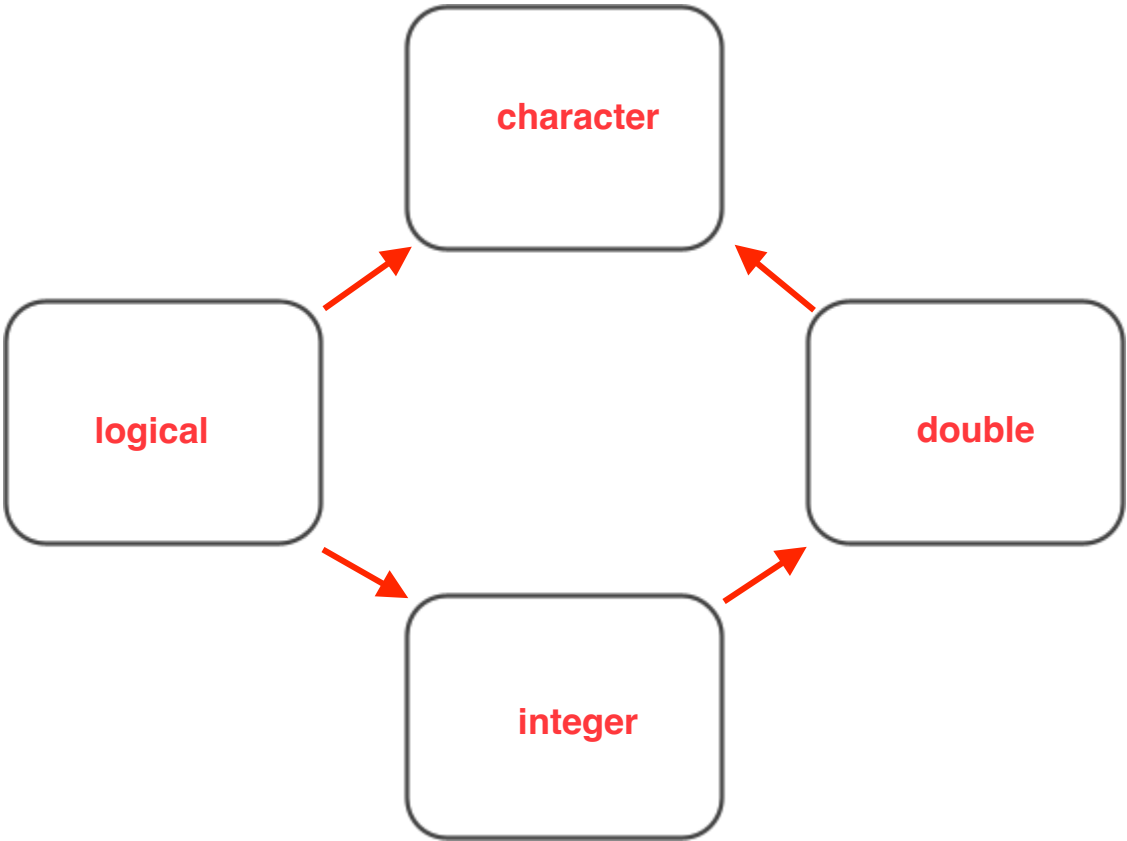
Code example	Output
<code>typeof(3.1415)</code>	
<code>typeof("pi")</code>	
<code>typeof(3L)</code>	
<code>typeof(TRUE)</code>	

Coercion

Inference

Code example	Output
<code>c(bird_species, bird_counts)</code>	[1] "California Towhee" "House Finch" "House Sparrow" [4] "9" "6" "8"
<code>c(bird_counts, song_freq_khz)</code>	[1] 9.00 6.00 8.00 4.99 2.66 4.08
<code>c(bird_counts, is_native)</code>	[1] 9 6 8 1 1 0
<code>c(song_freq_khz, bird_species)</code>	[1] "4.99" "2.66" "4.08" [4] "California Towhee" "House Finch" "House Sparrow"
<code>c(is_native, bird_species)</code>	[1] "TRUE" "TRUE" "FALSE" [4] "California Towhee" "House Finch" "House Sparrow"

When variables of two different types are combined, one variable takes on the type of the other. This is called **type coercion**. Fill in the boxes below with the four atomic types. Then draw arrows indicating the direction of coercion.



Prediction

Using the type coercion rules you inferred above, what will be the output of the following expressions?

Code example	Output
<code>typeof(c(bird_species, is_native))</code>	
<code>typeof(c(bird_counts, bird_counts))</code>	
<code>typeof(c(song_freq_khz, bird_species))</code>	
<code>typeof(c(is_native, song_freq_khz))</code>	