

### Learning Goals

- Use `ifelse()` statements to return a character or numeric value based on a condition
- Write your own functions using `function()` with parameters and a return value
- Use `while()` and `for()` loops to repeat a process, and recognize how infinite loops happen
- Use `apply()`, `lapply()`, and `sapply()` to “apply” a function across rows/columns, vectors, or lists
- Use `tapply()` and `aggregate()` to compute summary statistics by group

## Key Definitions / Functions

- `ifelse()`:
  
- `function()`:
  
- `while()`:
  
- `for()`:
  
- `apply()`:
  
- `aggregate()`:

## Practice Problems

For each task below, write the R code you would use *and* briefly describe what you expect the output to look like.

1. Create a vector named `colors` containing the values "red", "blue", NA, "red", "red", NA. Use the `ifelse()` to label the element as either present or missing.

2. Explain in words what the following `for()` loop will print:

```
> x <- c(3, 6, 8, 5)
> value <- 7
> for(i in 1:length(x)){
  value <- value + x[i] + i
}
> value
}
```

3. Give the output for the following dataframe and code:

```
> aggregate(books$chapters, by=list(books$genre), sum)
```

```
> books
  genre chapters
1  Fantasy     10
2  Mystery     25
3  Fantasy     18
4 Nonfiction     50
5  Mystery     30
6 Nonfiction     22
7  Fantasy     29
8  Mystery     20
9 Nonfiction     32
10 Mystery     39
```