Programming: practical 1

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In the questions below, the important part is **understanding** what's going on rather than just typing the R commands. If you are unsure of what's going on, please ask.

1 Practice questions

1. Basic functions

```
v = 5
Fun1 = function() {
    v = 0
    return(v)
}
Fun1()
```

```
## [1] 0
```

```
v
```

```
## [1] 5
```

(a) Why does the final line return 5 and not 0.

(b) Delete line 3 in the above piece of code. Now change Fun1 to allow v to be passed as an argument, i.e. we can write Fun1(5). Call this function to make sure it works.

(c) Now make the argument in Fun1 have a default value of 0.

2. Default arguments:

```
Fun2 = function(x = 10) {
    return(x)
}

Fun3 = function(x) {
    return(x)
}
```

(a) Why does this work:

```
Fun2()
```

but this raises an error

```
Fun3()
```

(b) Change Fun2 so that it returns $\sqrt{x}$.

3. `if` statements.

```
Fun4 = function(x) {
    if (x == 5) {
        y = 0
    } else {
        y = 1
    }
    return(y)
}
```

(a) Change Fun4 so that it:
   - returns 1 if x is positive;
   - returns -1 if x is negative;
   - returns 0 if x is zero.

4. `for` loops.

```
total = 0
for (i in 1:5) {
    total = total + i
}
total

## [1] 15
```

The `for` loop above calculates

$$\sum_{i=1}^{5} i$$

(a) What is the final value of `total` in the above piece of code?

(b) Change the above `loop` to calculate the following summations:

$$\text{(i)} \sum_{i=1}^{20} (i+1)$$

$$\text{(ii)} \sum_{j=-10}^{15} j$$

5. More `for` loops:

```
a = 2
total = 0
for (blob in a:5) {
    total = total + blob
}
```

(a) Delete line 1. Now put the above code in a function called `Fun5`, where a is passed as an argument, i.e. we can call `Fun5(1)`

(b) Alter the code so that the `for` loop goes from a to b, rather than a to 5. Allow b to be passed as an argument, i.e. we can call `Fun5(1,5)`.

(c) Change `Fun5` so that it has default arguments of `a=1` and `b=10`.

Solutions

Solutions are contained within this package:

```
library(nclRprogramming)
vignette("solutions1", package = "nclRprogramming")
```