Basic Course on R: Programming Structures 2 Practical

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25-28 May 2020

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1 Part A: Scope

1. For each of the following sets of commands, give the value that will be returned by the last command. Try to answer without using R.

   a)
   ```
   w <- 5
   f <- function(y) {
     return(w + y)
   }
   f(y = 2)
   ```

   b)
   ```
   w <- 5
   f <- function(y) {
     w <- 4
     return(w + y)
   }
   f(y = 2)
   ```

2. Among the variables `w`, `d`, and `y`, which are global to `f()` and which are local?

   ```
   w <- 2
   f <- function(y) {
     h <- function() {
       d <- 3
       return(w + y)
       }
     return(d * h())
     }
   ```

3. Do the following in R.

   a) Try:

   ```
   myFun1 <- function() {
     a <- 2
     b <- 3
     myFun2(3)
   }
   myFun2 <- function(y) {
     return(y + a + b)
   ```

```
}
myFun1()
```

What happens?

b) Now try:

```
a <- 1
b <- 2
myFun1()
```

What happens?

4. What value for `w` will be printed in the last line below? Try to answer without using R.

```
w <- 1
f <- function(y) {
  g <- function() {
    w <<- 3
    return(2)
  }
  return(g())
}
f(y = 1)
w
```

5. What value for `w` will be printed in the last line below? Try to answer without using R.

```
w <- 1
f <- function(y) {
  w <- 2
  g <- function() {
    w <<- 3
    return(2)
    }
  return(g())
}
f(y = 1)
w
```

2 Part B: `if()` Statements, `warning()`, and `stop()`

The functions `warning()` and `stop()` are used to print a warning message and to stop the execution of the function call and print an error message. For example:

```
noNegMean <- function(x) {
  if(all(x < 0)) {
    stop("All values in x are negative")
    }
  if(any(x < 0)) {
    x[x < 0] <- 0
    warning("Negative values in x replaced by zero")
    }
  return(mean(x))
  }
```

1. The file **nonegmean.txt** contains the above code; source it into R and then pass `noNegMean()` a vector containing some negative and some positive values. What happens?

2. What happens when you pass `noNegMean()` a vector containing all negative values?

3. Write a function `ratio()` that takes two arguments, `x` and `y`, and attempts to compute the ratio `x/y`. If both `x == 0 & y == 0`, the function should stop and print an error message about dividing 0 by 0. If `y == 0` (but not `x`), the function should print a warning message about dividing by 0, and then return `x/y` (which will be `Inf`). In all other cases, it should return `x/y`.

   Test your `ratio()` function first using two nonzero values for `x` and `y`, then using a nonzero `x` but `y = 0`, and finally using `x = 0` and `y = 0`.