Analysis of Environmental Data Lab

Functions

Eco 602 – University of Massachusetts, Amherst – Fall 2021
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Important Concepts

- Function declaration
- Function arguments (also known as parameters)
- Function body
- Scope
- Return statements
- Function-building strategies

Anatomy of a Function

Function Argument with default value

Function Argument

Function Declaration

Function Body (within curly braces)

```
my_fun = function(x, y, print = TRUE)
{
  if (print) print("hello!")
  return(x > y)
}
```

What does a function do?

1. Optionally accepts some input
2. Optionally performs some task
3. Optionally returns a value, perhaps silently, and exits

```
hello = function()
{
  print("hello!")
}
```

What does this function do?

Declaration	Invocation and Output

`hello = function()`
`{`
`  print("hello!")`
`}`
	`> hello()`
	`[1] "hello!"`

What does this function do?

Declaration	Steps

`hello = function()`
`{`
`  print("hello!")`
`}`
	• Accepts no input
	• Prints a message
	• Does not return a value

What does this function do?

Declaration	Steps

`my_fun = function(x, y, print = TRUE)`
`{`
`  if (print) print("hello!")`
`  return(x > y)`
`}`
	• Requires you to specify values for x and y.
	• You can optionally specify a value for 'print'
	• If print is TRUE, it prints a message.
	• Returns TRUE if x is greater than y, otherwise returns false

Arguments

Function Argument without default value

Function Argument with default value

```
my_fun = function(x, y, print = TRUE)
{
  if (print) print("hello!")
  return(x > y)
}
```

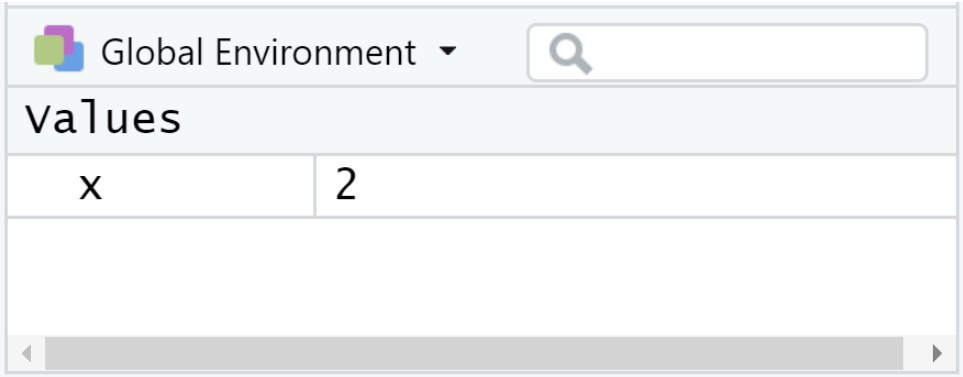
Arguments and Scope

- Inside the function body, your function can see:
  - Everything within the global environment.
  - The values of any arguments you have supplied.
  - Any temporary variables you create within the function body.
- After the function exits, temporary variables and argument values are not visible in the global environment.

Scope: What can this function see?


```
prnt_msg = function(msg)
{
  print(msg)
}
```

Scope: What can this function see?

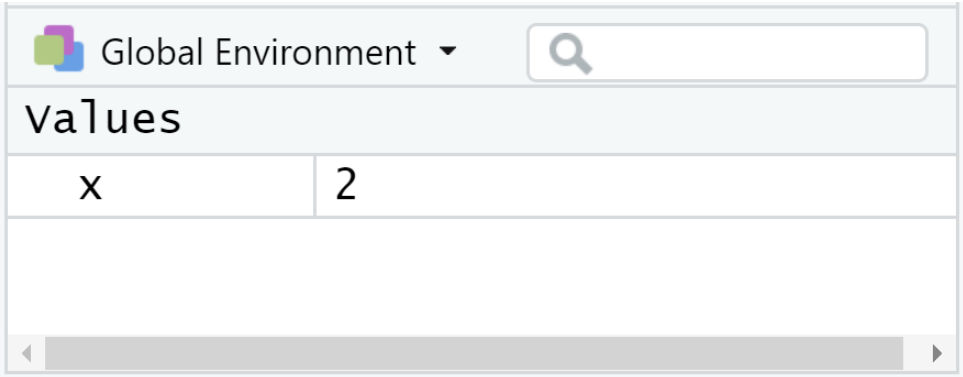



```
prnt_msg = function(msg)
{
  print(msg)
}
```

Scope: Will this function run?


```
prnt_msg = function(msg)
{
  print(x)
}
```

Scope: Will this function run?

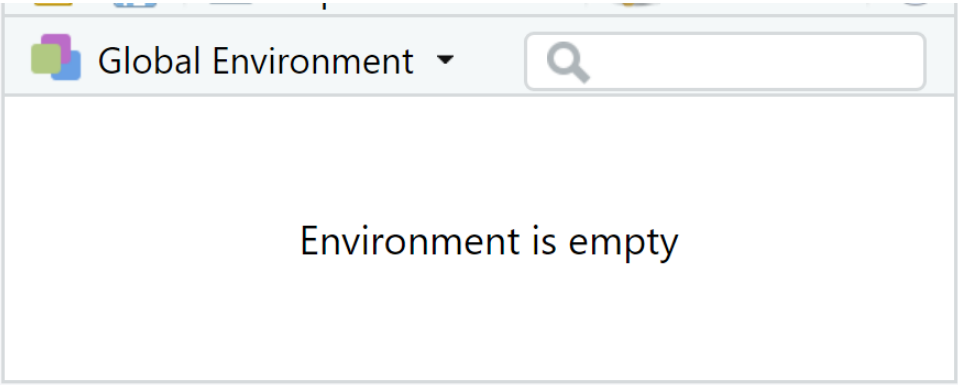



```
prnt_msg = function(msg)
{
  print(x)
}
```

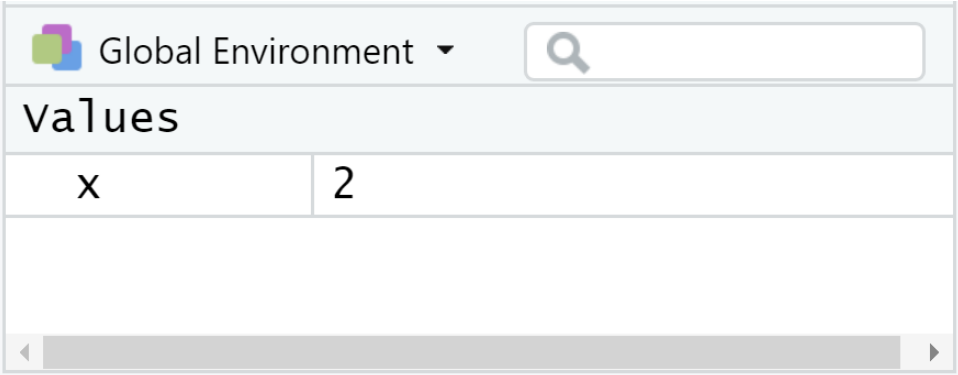
Scope: Function and Global Environments

```
> x = 2
> prnt_msg = function(msg)
+ {
+   print(msg)
+   print(x)
+ }
> prnt_msg("abc")
[1] "abc"
[1] 2
>
```

Before



After



- The function can see both ‘msg’ and ‘x’.
- The global environment only sees ‘x’

Strategies

- Work on your function code outside of the function.
  - When your code accomplishes what you want, you can ‘package’ it into a function.
- Use distinctive argument names.
  - It’s easy to have name collisions if you use argument names like ‘min’, ‘mean, etc.
- Your function shouldn’t reference global variables.
  - You can test this by running your function in a clean R environment.
- Let’s practice!