Week 3
functions and methods

STAT 198/298 Fall 2020

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Or send a browser to `slido.com`, event `#Z837`.

Poll:

If two objects are identical, that means...

Review

Equal vs identical copies

- **Equal**: Same value
- **Identical**: Same object in memory

```
CODE
```

Review

Equal vs identical copies

- **Equal**: Same value
- **Identical**: Same object in memory

If you want to create a non-identical copy, use:

- `list(object)`
- `object[:]`

Functions

Function: an encapsulated, reusable piece of code.

It's important to understand how a function deals with

- Documentation
- Arguments

```
CODE
```

Documentation

- Access with `?` or `help()`

Arguments

- Specify by position (those args preceding `\`) or by name, when available.
- Can access args at console using tab.
- Defaults are indicated either in named arguments with `=` or in the accompanying text (the optional args listed inside `[, ]`)

Writing functions

Python

```
a = [1, 3, 5]
def victorious_print(object):
    return print(object, end = "victory!")
victorious_print(a)
```

```
## [1, 3, 5]victory!
```

R

```
victorious_print <- function(object) {
  paste(object, "victory!")
}
victorious_print(py$a)
```

```
## [1] "1 victory!" "3 victory!" "5 victory!"
```

Poll

Write a function that takes a given string, and outputs it as a single string repeated `n` times, each one separated by a `.`.

Anonymous functions in Python

It can be helpful to have one-liner functions for use within another function, not to be reused or called by name. In Python these are called *lambda functions*.

```
list(map(lambda x: x * 2 , a))
```

```
## [2, 6, 10]
```

These also exist in R.

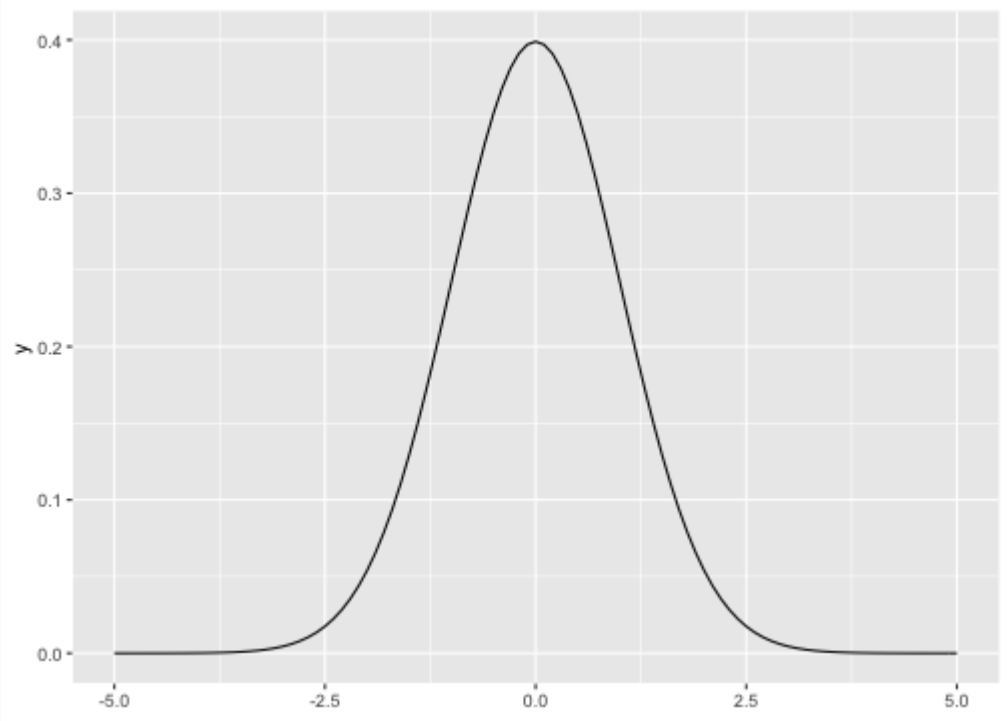
Anonymous functions in R

```
py$a %>%
  map(function(x) x * 2)
```

```
## [[1]]
## [1] 2
##
## [[2]]
## [1] 6
##
## [[3]]
## [1] 10
```

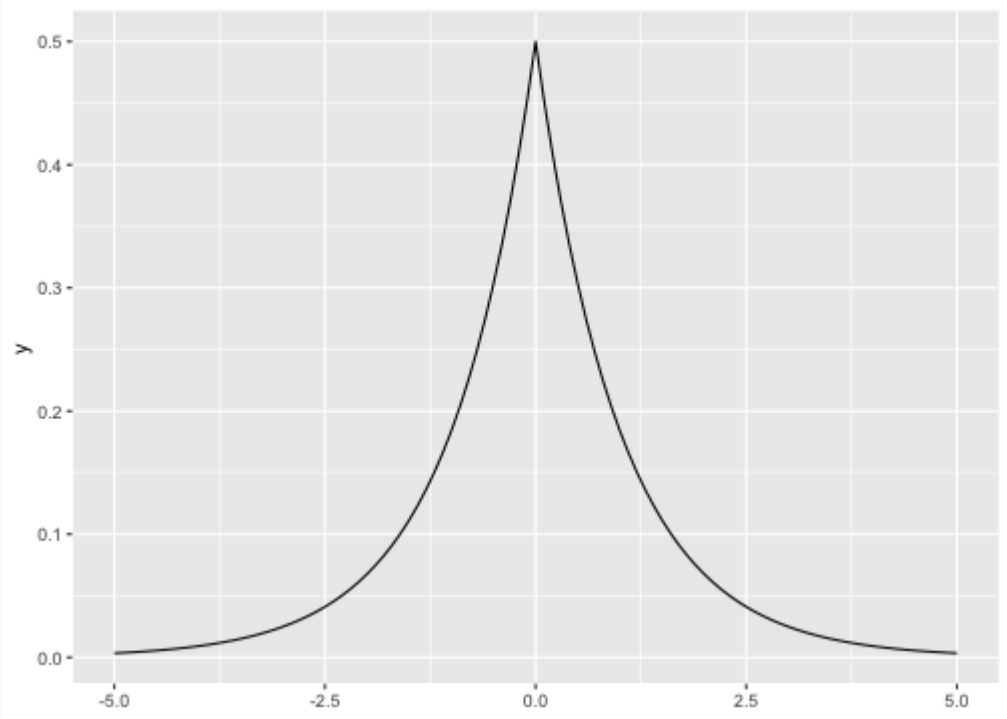
Anonymous functions in R

```
library(ggplot2)
base <- ggplot() +
  xlim(-5, 5)
base +
  geom_function(fun = dnorm)
```



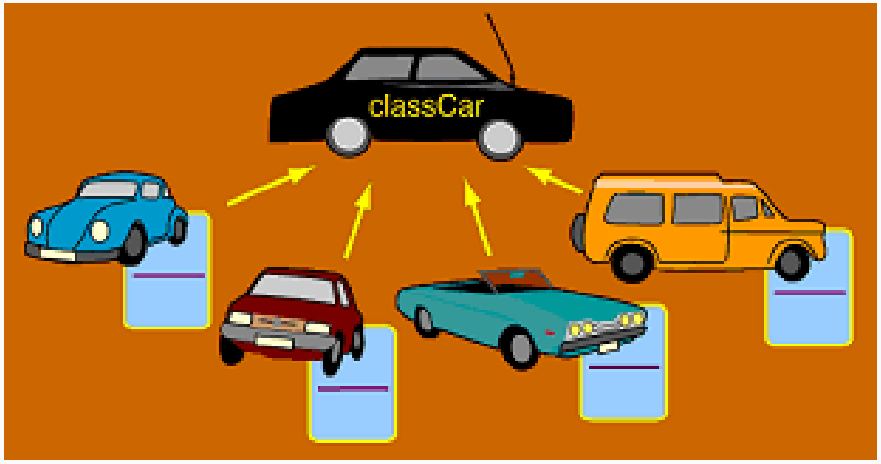
Anonymous functions in R

```
base +
  geom_function(fun = function(x) 0.5*exp(-abs(x)))
```



Methods

Methods are functions associated with a particulate kind of object. A particular kind of object is called a *class*.



- Class: car
- Objects: VW Beetle, Ford Escort, Buick Landyacht, etc
- All of these have their own associated *attributes* and *methods*.

Attributes vs Methods

Attributes are properties that distinguish one instance of an object from others in its class. *Methods* are functions specific to that class that take the object as an argument.

Car attributes

- Make
- Model
- Year of Manufacture

Car methods

- Drive
- Brake
- Fill with gas

CODE

Attributes vs Methods in Python

Query both on an object with `dir()` or use tab completion.

- Attributes take the format `__attribute__` and methods just `method`.
- Both can be called by prefixing with `object`.
- Some methods change the object, others do not.

Recall: Poll

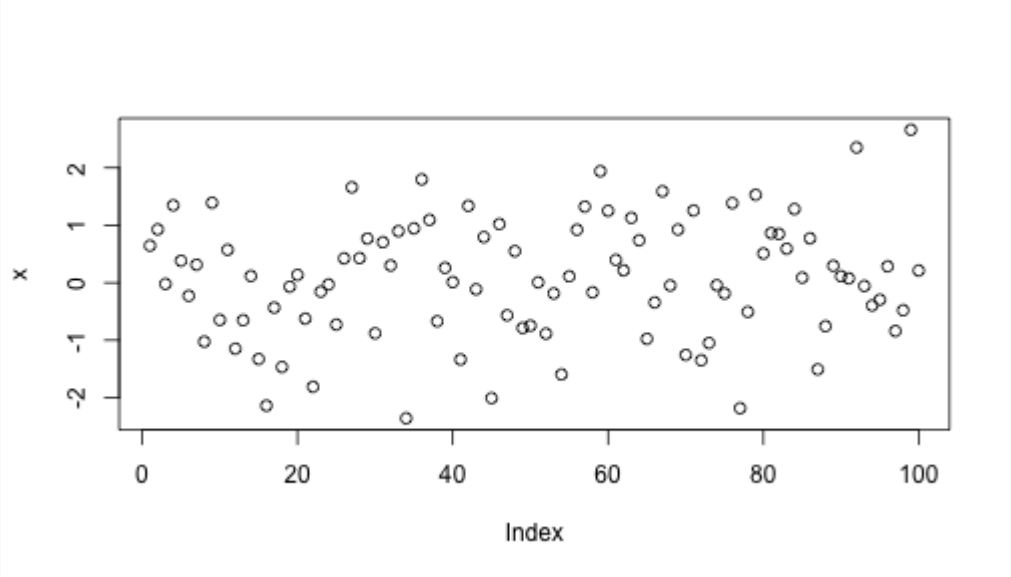
Write a function that takes a given string, and outputs it as a single string repeated `n` times, each one separated by a `.`.

Could have restricted this to work on strings either for checking for the `type()` inside the function, or by making it a method for strings.

Object-oriented Programming in R

Consider what happens when I use `plot()` in two different scenarios.

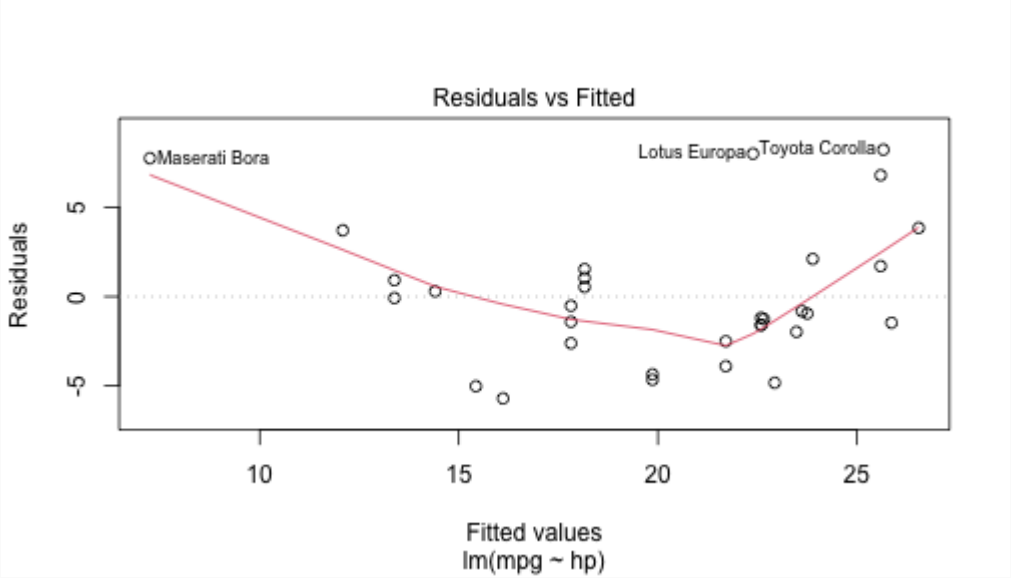
```
x <- rnorm(100)
plot(x)
```



Object-oriented Programming in R

Consider what happens when I use `plot()` in two different scenarios.

```
m1 <- lm(mpg ~ hp, data = mtcars)
plot(m1)
```



Object-oriented Programming in R

```
class(m1)
class(x)
```

```
## [1] "lm"
```

```
## [1] "numeric"
```

CODE

Assignments this week

- Homework 3 will be due Friday 8 pm
- Lab 3 will be due Sunday 8 pm