A design recipe for functions

PyLadies Atlanta

January 2017

Emily Reese 🌐 eareese.com

Program by Design

programbydesign.org/overview

> One of the most pressing problems that the beginning student of programming (or of any other creative art) encounters is what we call the Blank Page Syndrome: the student, given a problem statement, confronts a blank page...and doesn't know how to begin.

Blank Page Syndrome?

Why the design recipe?

- **Problem-solving requires synthesis.** Good programming takes more than memorizing syntax rules and what's available in the standard library.
- **Code is communication** -- with the computer, with other people, even with oneself in the future.
- Overcoming **BPS** 📖
  - Getting started
  - Getting unstuck

Steps of the design recipe

📋 Step 1. Data definition

- How is the important information represented?
- What are the input(s) and output?

```
""" Step 1. Design recipe example: f_to_c

Data definitions:

A Temperature is a Number.

Input: Temperature in F
Output: Temperature in C

"""
```

📋 Step 2. Specification

- **Contract**
  - Write contract based on data definitions
- **Purpose statement**
  - Write out the purpose of the function in full sentences
- **Examples**
  - Make up examples that demonstrate the expected output

Remember give the function a **name**.

📋 Step 2. Specification

```
""" Step 2. Design recipe example: f_to_c

Contract:
Number -> Number

Purpose statement:
This function takes a temperature measured in Fahrenheit,
and returns the equivalent Celsius temperature.

Examples:
f_to_c(32) -> 0
f_to_c(212) -> 100
f_to_c(-40) -> -40

"""
```

📋 Step 3. Implementation

Time to define the function.

```
""" Step 3. Design recipe example: f_to_c """

def f_to_c(temp):
  return temp
```

When writing the body of the function, it's better to write an ***incorrect*** *implementation that* ***fulfills the contract*** *from earlier steps* of the recipe, than to try and write a completely correct implementation.

📋 Step 4. Testing

Turn the examples from Step 2 into working tests.

```
""" Step 4. Design recipe example: f_to_c
Examples:
f_to_c(32) -> 0
f_to_c(212) -> 100
f_to_c(-40) -> -40
"""
def f_to_c(temp):
  return temp


assert(f_to_c(32) == 0)
assert(f_to_c(212) == 100)
assert(f_to_c(-40) == -40)
```

📋 Step 5. Review

- Review test results
- Refactor the function body
- Repeat as needed

Wishlist

Find yourself wishing you had a certain function as you review? Make a "function wishlist" and keep following the recipe to design each of them. 🌟

Case study

Design recipe example: `f_to_c`

- Complete example: https://repl.it/FVTM/2

Design recipe practice:

Project Euler problem 1

- Prompt: https://projecteuler.net/problem=1
- Template: https://repl.it/FVUr/3

The end