CS115 – Lab 2: The Design Recipe & Helper Functions

Spring 2020

Purpose and Instructions

The purpose of this lab is for you to practice using the design recipe, including testing.

- Use `check-expect` or `check-within`, as appropriate. We have provided public tests that you can use to check your work, but please do not use them as a replacement for designing your own tests.
- Create a separate file for each question. Keep them in your "Labs" folder, with the name `lNNqM.rkt` for Lab NN, Question M. Download the headers for each function from the file `labinterface02.rkt` linked off the "Labs" page on the course Web site.
- After you have completed a question (except class exercises), including creating tests for it, obtain feedback by submitting it and requesting a public test. Follow the instructions given in the Style Guide.

Question 1: Last character of a `Str`

Exercise

Follow the **design recipe** to create a function `(last-char s)` that consumes a nonempty `Str` and returns a `Str` consisting of the last character in `s`.

1. Write the **purpose**.
2. Determine the **contract**.
3. Create at least two **examples**.
4. Only after completing steps 1-3, write the **implementation**.
5. Write some **tests**, different from your examples.

Question 2: Parking Rates

The airport parking lot has rates by the week and by the day, where you pay the weekly rate of $74.95 for each complete week (any consecutive seven days) and the daily rate of $14.95 for any remaining days.

Exercise

Follow the **design recipe** to create a function `(airport-parking number-of-days)` that returns the cost of parking for `number-of-days`.

1. Write the **purpose**.
2. Determine the **contract**.
3. Create at least two **examples**.
4. Only after completing steps 1-3, write the **implementation**.
5. Write some **tests**, different from your examples.

Hint This is a good place to use at least three constants.

Question 3: Shipping Costs

The cost of shipping a bunch of identical boxes depends on several values: the **cost per kg**, the **mass of a single box**, the **number of boxes**, and a **fixed handling charge** (a fixed cost for a shipment of any size).

Exercise

Follow the **design recipe** to create a function `(shipping-bill per-kg box-mass box-count handling)` that determines the cost for shipping merchandise.

1. Write the **purpose**.
2. Determine the **contract**.
3. Create at least two **examples**.
4. Only after completing steps 1-3, write the **implementation**.
5. Write some **tests**, different from your examples.

Question 4: Chopping up a `Str`

Exercise

Follow the **design recipe** to create a function `(trim-string s n)` that consumes a `Str` and a `Nat`, and returns a `Str` with the first and last `n` characters from `s` removed. `(trim-string "example" 2) => "amp"`
You can assume that `s` will always contain at least $2n + 1$ characters.

1. Write the **purpose**.
2. Determine the **contract**.
3. Create at least two **examples**.
4. Only after completing steps 1-3, write the **implementation**.
5. Write some **tests**, different from your examples.