Lab 2: Designing functions

Create a separate file for each question. Keep them in your "Labs" folder, with the name `liqj` for Lab i, Question j. See **Helpful tips** for information on creating and naming files.

Download the headers for each function from the file `labinterface2.rkt` linked off the "Labs" page on the course Web site.

You can obtain feedback on your work (except warm-up exercises) by submitting it and requesting a public test. Follow the instructions given in the Style Guide. The same process is used to perform basic checks on your assignment work.

This lab uses the teachpack `potatohead.rkt`; your lab instructor will walk you through the process of downloading and installing it. You should also be familiar with the information on potatoheads given in the file linked off the Resources page on the course Web site.

Language level: Beginning Student.

1. *[Class exercise with lab instructor assistance]* Using instructions given in class and in **Helpful tips**, download and install the teachpack `potatohead.rkt`. Next, using **define** and the functions *create-ph* and *draw-ph*, create and then display a potatohead *myph* (or with a more colourful name, if you like). Now create a potatohead *newph* that is like *myph* except that both eyes match the left eye of *myph*. Where possible, use potatohead functions. What you type in to create *newph* should work no matter how you defined *myph*.

2. *Warm-up exercise* [Adapted from HtDP exercise 2.4.2] Type each of the following definitions, one by one, into the *Definitions* window and click `Run`. Read the error messages and fix the errors.

```
(define (f 1)
  (+ x 10))
(define (g x)
  + x 10)
(define h(x)
  (+ x 10))
```

3. *Warm-up exercise* [Adapted from HtDP exercise 2.4.4] Enter the following Scheme program into the *Definitions* window and click `Run`:

```
(define (somef x)
  (sin x x))
```

   Then, in the *Interactions* window, evaluate the expressions (*somef* 10 20) and (*somef* 10). Read the error messages and note what DrRacket highlights.

4. Create a function *sleep* that consumes a potatohead and produces a potatohead that has the same colours as in the original, but eyes and mouth are both of type 'line. Hint: you may find this question easier to complete if you take the time to read through all of the documentation on the teachpack so that you can make the best choice of functions to use.

5. Create a function *onehalf* that consumes a positive integer (*nbr*) and produces the closest integer less than or equal to *nbr* divided by 2. That is, (*onehalf* 16) and (*onehalf* 17) will both produce 8. Hint: use *quotient*.

6. Create a function *child* that consumes two potatoheads (*mom* and *dad*) and produces a potatohead half the size of *mom*, with the same eye and mouth types as *mom* and the same colours as *dad*. You may wish to use the function *onehalf* that you just created.

7. *Optional open-ended questions* Create more functions that alter given potatoheads, or form a single potatohead from the attributes of two or more potatoheads. You can also create more attributes relating to particular features or sets of features.

Helpful tips Except as marked, all tips are tips for using DrRacket.

Opening a new file Under "File" on the menu bar, select "New" (or "New Tab", if you wish to add tabs to a current window).

Opening an existing file Under "File" on the menu bar, select "Open...". This will bring up a window that lets you select a file to open.

Saving a file Press the "Save" button on the window. If this is a new file, you will see a window that lets you choose a name for your file and a directory to put it in.

Copying from a file You can copy information from one file to another by highlighting text, choosing "Copy" in the "Edit" menu on the menu bar, clicking on the tab or window of another file, and using "Paste" in the "Edit" menu on the menu bar. The menu also shows keyboard shortcuts.

Downloading a file (Web browser) Teachpacks and documentation files can be found on the "Resources" page on the course Web site. Bring up the page in a browser and click on the link to download the file. Make sure that you save it to your personal folder (labeled with your userid) and that you keep track of where you have saved it. Ask your lab instructor if you need help finding a Web browser on the Mac.

Loading a teachpack A teachpack is a file with Scheme definitions in it. Loading a teachpack means you can use any of the definitions as if they were built-in definitions. Under "Language" on the menu bar, select "Add Teachpack...". In the left column in the window that pops up "Preinstalled Teachpacks", choose the appropriate teachpack from the textbook. For a course teachpack, first download the file (see above). If it is the first time you are installing a course teachpack, click on the button "Add Teachpack to List". This will bring up a window that lets you select a file. Once the file has been added to the list, you can select it from the list "User-installed Teachpacks".

Clearing all teachpacks Under "Language" on the menu bar, select "Clear All Teachpacks".

Managing files (general advice) You might wish to organize your account so that you have folders for labs, assignments, teachpacks, and other downloads from the course Web site.