CS 2500, Spring 2012
Problem Set 9

Due date: Wednesday, March 28 @ 11:59pm

Programming Language: Intermediate Student Language with Lambda

For Problem Set 3 and later, homework is submitted via the <u>automated homework server</u>. *Note: Hardcopy submissions not accepted.*

You must work on this problem set in pairs. New homework partners have been posted on the Piazza discussion board. You must submit the homework with your partner. There will be a penalty for submitting the assignment without your partner.

You must follow the design recipe in your solutions: graders will look for data definitions, contracts, purpose statements, examples/tests, and properly organized function definitions. For the latter, you **must** design templates. You do not need to include the templates with your homework, however. If you do, comment them out.

Problem 1:
Edit your Frogger project once again. Be sure to fix any and all problems that your graders have (or would have) discovered.

Next, you are to use local and "loop functions" (abstractions such as map, foldr, filter, *etc*.) wherever your functions may benefit from them, especially for the lists of objects in your project.

You should notice that the length of your program decreases considerably.

Problem 2:
Develop data definitions for binary trees of `Symbol`s, and binary trees of `Number`s. The numbers and symbols should occur at the leaf positions only.
Create two instances of each, and *abstract* over the data definitions.

Design the function `height`, which consumes any binary tree and computes its height. That is, the maximum number of `node`s from the root of the given tree to a leaf. Here are some tests to further explain:

```
(check-expect (height 5) 0)

(check-expect (height (make-node 'yes (make-node 'no 'maybe))) 2)
```

HtDP Problems:
20.2.2, 20.2.4, 21.2.1, 21.2.2, 21.2.3