Homework 4

Due: 13 February 2014

Problem 4.1   — practical

Use `map`, `filter`, and `foldl` (and other higher-order list functions, if you want to look them up), and write expressions using them to do the following:

a. produce a list of all the perfect squares in `numlist` (a list of numbers)

b. produce a list of lengths of each string in `strlist` (a list of strings)

c. compute the total number of characters in all the strings in `strlist` (a list of strings)

You can write helper functions (and will have to, for some of them) but in each case should use a builtin list function to do the list processing.

Problem 4.2   — theoretical

Give the five-tuple $(Q, \Sigma, \delta, q_0, F)$ for the DFA with the following diagram:
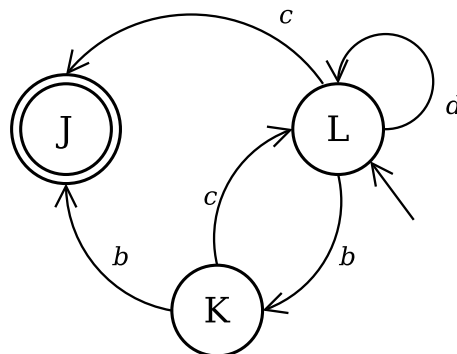
Then, indicate for each of the following strings whether it is in the language accepted by the DFA:

a. *c*
b. *abcd*
c. *dddd*

d. *bcbcc*
e. *bcbcbb*
f. *bcc*
g. *ddbcbcc*
h. *cbcb*
i. *dddbcbcbb*
j. ϵ (meaning the empty string)

Problem 4.3   — theoretical

Draw the transition diagram for the DFA with the following transition table:

		s	g	h
	*R	—	V	—
→	S	R	T	—
	*T	V	—	—
	V	R	T	V

Then, indicate for each of the following strings whether it is in the language accepted by the DFA:

a. *gshhhhhs*
b. *g*
c. *ghsg*
d. *sggshhsgs*
e. ϵ
f. *sgs*
g. *sgss*
h. *ghsghs*
i. *gshgshgshg*
j. *sgh*

Hand in the file(s) containing the Racket expressions using the handin script:

```
handin cmsc208 hwk4 myfile.rkt
```

I do not recommend doing the theoretical work in LaTeX—you'll want to do this one on paper (bring it to class and hand it in there).

Collaboration policy: **For Problems 4.1:** collaborative. You each have to hand in your own version of the assignment, but you can talk to other people about the problems. Mention in a comment or readme who you worked with. (Still no copying, though.) **For Problem 4.2–4.3:** group work! If you work with other people on this homework, you can just hand in one copy and put all your names on top. There will be a revision cycle for this.