CS 541 — Programming Languages 1 May 17, 1996

Homework 8: Denotational Semantics

1. (2 points) Do problem 1(c) on page 31 of Schmidt's book.
2. (2 points) Do problem 2(c) on page 31 of Schmidt's book.
3. (4 points) Do problem 11, parts (a) and (b) on page 32.
4. (6 points) Do problem 12, parts (a), (c), and (e) on page 32.
5. (6 points) Do problem 14, parts (a), (e), and (g) on page 33.
6. (extra credit only) Do one or more of problems 6, 7, 15, and 16 on pages 31-33 of Schmidt's book.
7. (10 points) Do *one* part of problem 2 on page 54. Which part you do is up to you. You may also invent a similar problem if it would be more interesting to you, but you have to tell us what that is.
8. (6 points) Do exercise 3, parts (c), (f), and (l) on page 55.
9. (extra credit only) Do one or more (parts of) exercises 11, 12, and 13 (d) on page 57 of Schmidt's book.
10. (10 points) Translate the denotational semantics given in figure 4.3 (page 67) of Schmidt's book into Standard ML. You may use SML's booleans and integers for the domains **B** and Nat. You may use SML's lists for the domain Nat^*. Test your program on the inputs on pages 69-70, remembering that the stuff in the syntax brackets $[\![\cdot]\!]$ is not strings to be parsed, but represents abstract syntax trees.

    Make your program file look as much like the denotational semantics format as you can (without going to too much trouble).
11. (10 points) Then modify your program for the calculator semantics from the previous problem as described in problem 5 on page 71.
12. (extra credit only) Modify your program for the calculator semantics as described in problem 6 on page 71.
13. (20 points) Either on paper or in Standard ML, do problem 8 on page 72 of Schmidt's book. Your design doesn't need to be big, but it should be useful and elegant. For clues on what kinds of operations you might wish to have on strings, think about some applications, or consult the reference manuals for a few programming languages you know.

    Instead of answering the last question after part (d) of this problem, write a paragraph comparing your experience designing this language versus your experience in designing the language features in the for the second homework. (This paragraph is worth 2 points.)