CS 227X — Introduction to Programming May 17, 1996

Homework 6: Interactive Programming

Due:

We continue suggesting some problems for additional practice. These have 0 points. You are not to hand these in to your TA. You should check your own work on them, and if you have questions, discuss them in recitation or with the staff, or with others in class.

1. (5 points; basic) Do exercise 6.1.
2. (7 points) What does the procedure `substring-ref` in problem 6.2 do? Do problem 6.2.
3. (0 points; suggested practice) Do problem 6.3.
4. (0 points) Do problem 6.4.
5. (6 points; basic) Do problem 6.5.
6. (10 points) Do problem 6.6.
7. (10 points) Do problem 6.7. Note that, according to the errata, if you have the first printing of the textbook, you should change "C" to "E" in the last two lines of page 177, and change "D" to "F", and on top of page 178, change step 5 to read: "Set R equal to F modulo 7".
8. (12 points; extra credit only) Write a function `histogram` that takes a list of integers between 0 and 20, and prints output like the following, with one asterisk for each occurrence of the number. (Another name for this is a bar-graph.) For example,

```
> (histogram '(3 4 3 20 0 20 8 8))
20: **
19:
18:
17:
16:
15:
14:
13:
12:
10:
 9:
 8: **
 7:
 6:
 5:
 4: *
 3: **
 2:
 1:
 0: *
> ; this line is the next prompt
```

9. (10 points; extra credit only) Do problem 6.8.
10. (10 points; extra credit only) Do problem 6.9.

11. (10 points) Do problem 6.10.

12. (15 points) Do problem 6.11.

13. (0 points; suggested practice only) Do problem 6.12.

14. (0 points; suggested practice only) Do problem 6.13.

15. (6 points; extra credit only) Do problem 6.14.

16. (7 points; extra credit only) Do problem 6.15.

17. (0 points; suggested practice only) Do problem 6.16.

18. (10 points; extra credit only) Pat Prolog wants to know her grade in this course more exactly than the posted grade. The trouble with the posted grade is that it doesn't take into account the extra credit she has earned. According to the course *Red Tape* handout, each 10 points of B+ or better work on extra credit problems raises the score of one test or homework by a single step (e.g., from a B to a B+). The handout says that the raises will be applied to her lowest test or homework.

    Write a program to figure out the best way (for Pat) to apply her extra credit points. Assume that the input is the number of extra credit points, and a grades-list of the form:

    ```
    ((homework-grades A B B+ A- B+) (test-grades B A-))
    ```

    You are to prompt for these inputs, and then print what should be done in messages of the following form:

    ```
    Raise test 1 grade from B to B+
    Raise test 1 grade from B+ to A-
    Raise test 1 grade from A- to A
    Raise test 2 grade from A- to A
    Raise homework 2 grade from B to B+
    ```

    Your program is to return the estimated grade, as an inexact number between 0.0 (= F) and 4.0 (= A). Consult the course *Red Tape* handout about estimating final grades. State the mathematical formula you are using clearly in your comments.