EECS 297/397 Special Topics: C/C++ Programming Spring 2020

Assignment 1: Basic data structures and String Manipulation

Instructor: Orhan Özgüner Due: February 13 before 11:59 PM

This assignment consists of two required components and one bonus.

Part 1

The first part involves making the dice parser we showed in class able to parse somewhat more complicated dice expressions. Instead of just those of the form "**N** *d* **A**", you will need to handle flat addition/subtraction modifiers, and multiplication of the result- these expressions are of the form "$\mathbf{M} * \mathbf{N}$ *d* $\mathbf{A} + \mathbf{b}$" or "$\mathbf{M} * \mathbf{N}$ *d* $\mathbf{A} - \mathbf{b}$".

Note that $4 * 3$ *d* 6 is *not* the same thing as 12 *d* 6- the latter selects a random number from 1 to 6 twelve *times*, but the former selects only 3 numbers and multiplies them by a constant value of 4. Thus, while 12 *d* 6 can produce any number from 12 to 12×6 (each of the 12 dice can take on a value of at least 1 and at most 6), $4 * 3$ *d* 6 can only produce numbers that are multiples of 4.

Also note that your code should still work for expressions that do *not* contain the "$\mathbf{M}*$" and/or "$-\mathbf{B}$" terms.

A test file is included with the assignment upload as *dice_part_1.txt*.

Part 2

Next, you will need to make the parser search through text that contains dice expressions mixed in among other arbitrary words and numbers. You will then need to "roll" them in place and reinsert them. For instance,

> School enchantment (compulsion) [emotion, mind-affecting]; Level psychic 4 This functions as ego whip I, but the target takes a –4 penalty to the chosen ability score and is staggered for **1d4** rounds on a failed Will save. This spell can be undercast.
>
> Ego Whip III School enchantment (compulsion) [emotion, mind-affecting]; Level psychic 5 This functions as ego whip I, but the target takes a –6 penalty to the chosen ability score and is staggered for **1d6** rounds on a failed Will save. This spell can be undercast.
>
> Ego Whip IV School enchantment (compulsion) [emotion, mind-affecting]; Level psychic 6 This functions as ego whip I, but the target takes –8 penalty to the chosen ability score and is staggered for **1d8** rounds on a failed Will save. This spell can be undercast.
>
> Ego Whip V School enchantment (compulsion) [emotion, mind-affecting]; Level psychic 7 This functions as ego whip I, but the target takes –10 penalty to the chosen ability score and is staggered for **1d10** rounds on a failed Will save.

becomes

School enchantment (compulsion) [emotion, mind-affecting]; Level psychic 4 This functions as ego whip I, but the target takes a –4 penalty to the chosen ability score and is staggered for **3** rounds on a failed Will save. This spell can be undercast.

Ego Whip III School enchantment (compulsion) [emotion, mind-affecting]; Level psychic 5 This functions as ego whip I, but the target takes a –6 penalty to the chosen ability score and is staggered for **4** rounds on a failed Will save. This spell can be undercast.

Ego Whip IV School enchantment (compulsion) [emotion, mind-affecting]; Level psychic 6 This functions as ego whip I, but the target takes –8 penalty to the chosen ability score and is staggered for **7** rounds on a failed Will save. This spell can be undercast.

Ego Whip V School enchantment (compulsion) [emotion, mind-affecting]; Level psychic 7 This functions as ego whip I, but the target takes –10 penalty to the chosen ability score and is staggered for **9** rounds on a failed Will save.

You can assume that all "dice" expressions will have a lowercase letter 'd' preceded and followed by at least one number, and that all expressions of such type are "dice" expressions. You do not need to consider an expression that runs over multiple lines.

This file is included with the assignment upload as *dice_part_2.txt*.

Part 3 (Bonus)

Expand the parser still further to find dice expressions inside of the elements of other dice expressions, wrapped in parentheses, for instance "$4\ d\ (1\ d\ 6)+2$" or "$(1\ d\ 4)+(3\ d\ 8)$". These expressions can continue on for arbitrary depth, like "$(1\ d\ (1\ d\ 6))*(3\ d\ ((1\ d\ 6)\ d\ 2))$".

A test file is included with the assignment upload as *dice_part_3.txt*.