MCS 253P - Lab 7

**Lab 7.1 - Prime Factorization (25 pts)**

Write an *efficient* program that takes a set of integers and returns the prime factorization for each. Your main should use this function to print the prime factorization of a set of numbers entered in by the use.

Please only implement an algorithm you understand well and can explain fully to someone who would ask questions and critique it. Think on your own first, but feel free to do research.

Input:

* an integer (via stdin)

Output:

* the prime factorization (via stdout)

Example:

input:

176

257

7249

21560

end

output:

(2)^4 (11)^1

(257)^1

(11)^1 (659)^1

(2)^3 (5)^1 (7)^2 (11)^1

**No edge case reporting is necessary for this problem! However the test input will test a few edge cases! (As long as you have a reasonable output for them, that is fine. If you have questions about possible edge cases, please feel free to discuss on Piazza).**

**Lab 7.2 - Empirical Formula (75 pts)**

Write a function that takes a formula of symbols and converts it to an “empirical notation” (here is how [empirical notations](https://drive.google.com/open?id=1Xo_ch2Er4LfTXeA4ZZtSVETm2cu-b5wU) work for molecules). All symbols start with a capital letter, and are possibly followed by lowercase letters.

You may reuse ideas/code from your previous lab/hw problems.

Your main program should read in symbolic formulas and use your function to convert them to their appropriate empirical notation.

Input:

* a valid symbolic formula (via stdin)

Output:

* the corresponding empirical notation (via stdout)

Example:

input:

C6H12O6

CH3COOH

CH3C(OH)3

X4Z2Y5(XZ2(Z(XY3)3)2XY(X2YYZ)3)4

output:

CH2O

CH2O

C2H6O3

X4Y7Z2

**No edge case reporting is necessary for this problem! However the test input will test a few edge cases! (As long as you have a reasonable output for them, that is fine. If you have questions about possible edge cases, please feel free to discuss on Piazza).**