**NTUST OOP Midterm Problem Design**

| **Subject:** **Arithmetic Equations In String** |
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| **Main testing concept:** String   | **Basics** | **Functions** | | --- | --- | | ■ C++ BASICS  ■ FLOW OF CONTROL  □ FUNCTION BASICS  □ PARAMETERS AND OVERLOADING  □ ARRAYS  □ STRUCTURES AND CLASSES  □ CONSTRUCTORS AND OTHER TOOLS  □ OPERATOR OVERLOADING, FRIENDS,AND REFERENCES  ■ STRINGS  □ POINTERS AND DYNAMIC ARRAYS | □ SEPARATE COMPILATION AND NAMESPACES  □ STREAMS AND FILE I/O  □ RECURSION  □ INHERITANCE  □ POLYMORPHISM AND VIRTUAL FUNCTIONS  □ TEMPLATES  □ LINKED DATA STRUCTURES  □ EXCEPTION HANDLING  □ STANDARD TEMPLATE LIBRARY  □ PATTERNS AND UML | |
| **Description:**  Arithmetic is the fundamental branch of mathematics that studies numbers and their operations. In particular, it deals with numerical calculations using the arithmetic operations of addition, subtraction, multiplication, and division. The order of operations is a collection of rules about which operation should perform first where multiplication and division should be executed first and addition and subtraction should be applied second. For example, to evaluate 1+2\*3, the multiplication should be applied first, and the addition should be applied after the multiplication. Thus, the expression should have the value of 1 + (2 × 3) = 7, and not (1 + 2) × 3 = 9. When we would like to override the operator precedence, or even simply emphasize them, the parentheses ( ) can be used. For example, (2 + 3) × 4 = 20 forces the addition to be done before the multiplication.  **Input:**  Each test case may contain multiple equations. Each equation is placed on a separate line. Equations consist of operators and operands. There are four types of operators in equations: addition, subtraction, multiplication and division. There are also parentheses in some of the equations. All parentheses of input are in pairs. The operands of input are **Z+ or zero,** and the operands are only composed of numbers.Furthermore, the number may be out of the range of unsigned long, please store and calculate numbers in string.  **Output:**  Please perform the result of equations. All numbers of output should be integer numbers or zero.  **Sample Input / Output：**   | Sample Input | Sample Output | | --- | --- | | (25+3)\*125/5  333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333333\*3+1  49/(5+2)-128/(4\*4)-42 | 700  1000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000000  -43 | |
| **□ Eazy, Only basic programming syntax and structure are required.**  **□ Medium, Multiple programming grammars and structures are required.**  **■ Hard, Need to use multiple program structures or more complex data types.** |
| **Expected solving time:**  90 minutes |
| **Other notes:**  **There are not any decimals in the process of this problem.**  **Operands won’t divide by zero in the process of this problem.** |