

## TWIT

The Twist system allows short text messages to be sent on your cell phone. A message can originally contain only numerals and small letters. Some words should automatically be changed by the system to shorten the message (For example, are = R, too = 2, two = 2, to = 2, and you = U). A message can be no more than 20 characters after the spaces have been removed and the substitutions have been done. For example,

are you fine too

would translate to

RUfine2

Appropriate error messages should be presented if the rules are not followed (if U use illegal characters or the message is 2 long).

## Down to the BASIC's

The BASIC program starts off by asking the user for a mathematical expression that could be used in a BASIC program. For example,

**Enter expression:**  $T*(V-43+(A*7))+(32-C)$

**This is correctly formed.**

The program then checks and reports (as shown) whether the expression is correctly written--no calculations need. If the expression is not correct, the program simply replies

**This is not correctly formed.**

All the rules for correct expressions in BASIC apply. There are some extra rules for this program which should make your job simpler. Here are the rules:

- The only characters allowed are: 26 letters, 10 digits and the symbols + - \* / ( and ).
- No negative numbers or variables. Only integer (whole) numbers.
- Variables must be a single capital letter.
- The operations are +, -, \* and /. (Addition, subtraction, multiplication and division--again, no unary negatives). Obviously, two operation symbols cannot appear next to each other.
- Parentheses may be used, but they must be properly nested and balanced.
- Assume no more than 40 characters in the expression. No spaces.

Here are a few examples of incorrectly formed expressions:

$P*13)+(I)$

Parentheses not balanced

$-45.2*P$

Negative number and decimal number

$-(S**S)$

Negative expression,

use of two operators in a row and variable is too long.

## Roman Numeral Calculator

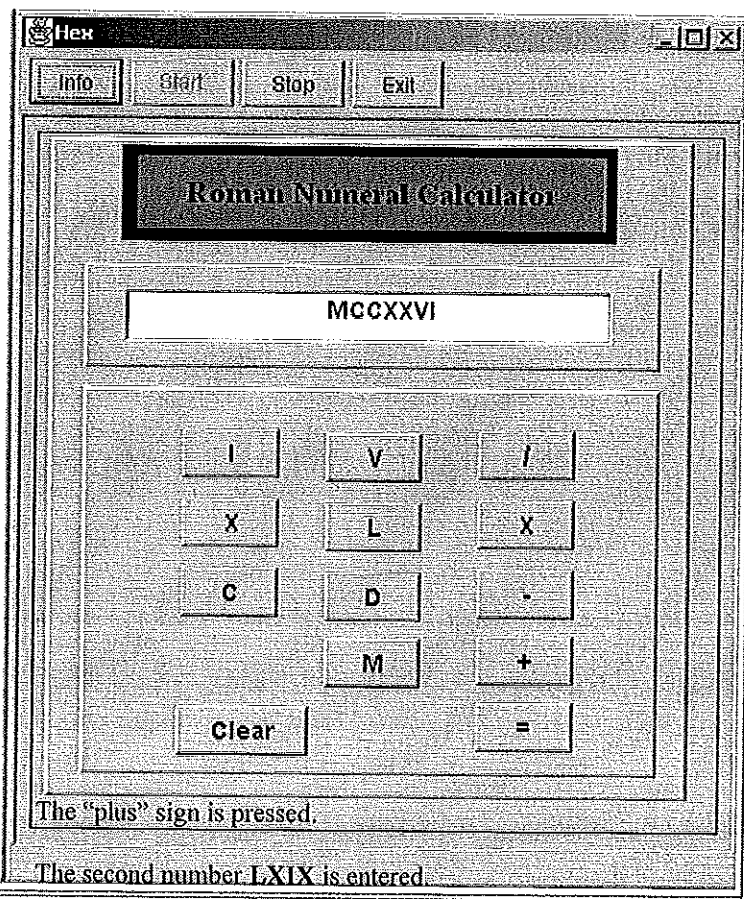
The Romans were noted for many significant advances in math, the sciences and fine arts. The numbering system they developed used Roman Numerals to common numeric values. The values of the Roman digits are as follows:

I	1
V	5
X	10
L	50
C	100
D	500
M	1,000

Design an applet that will allow the user to perform calculations on Roman Numerals. The arithmetic operators that your program should incorporate include: +, -, \*, and /.

EXAMPLE:

- a. The number **MCCXXVI** is entered.



JAVA (50 points)

- d. The "equal" sign is pressed.
- e. The following is the output generated.

