Great Computer Challenge Visual Basic Level IV

Complete all three problems.

Problem #1: HOW MUCH SPACE? (20 Points)

Write a program to calculate the area occupied by a vertical stack of metal sheets. Each metal sheet in the stack may be of different length and width (but each measure is an even number of inches). Your program should do the following:

- a. Ask the program for the number of sheets (10 maximum).
- b. Ask the program user for the length and width of each of the sheets
- c. Calculate and display the minimum total area occupied by this **vertical** stack.

Note: You may have to turn the sheets around to get the minimum area as you stack them flat and the areas overlap.

As an example, if there were three sheets and the first was 5 X 5, the second was 6 X 4, and the third was 1 X 8; then, the minimum area would be 31 square inches.

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Problem #2: Down to the BASICs (40 points)

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.

Problem #3: PRIMITIVE PEOPLE (40 points)

The year is **4047** and archaeologists have made a discovery that may forever alter the way they perceive the early members of the species Homosapiens. After close examination of the written artifacts that they discovered, they have determined that the ancient people who wrote these documents use an unusual numbering system made up of the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. They have coined a name for this new numbering system and now refer to it in scientific journals as the decimal system. Although they are puzzled why the ancient people would employ such a crude system, they are interested in exploring the relationship between this system and the two most common systems in current use. These systems are binary, and hexadecimal. The binary systems as the name suggests is base 2 (0, 1), while the hexadecimal system is base 16 (0, 1, 2, 3, 4, 5, 6, 7, 8, 9, A, B, C, D, E, F). This is point at which you come into the picture.

You are to write a program that prompts the user to select a numbering system and then enter a number in that system. Your program should at that point display the number as it would appear in the other two numbering systems. This should continue until the user indicates that they want to stop.

EXAMPLE: (bolded values denote user input)

Numbering Systems Supported

- a. decimal
- b. binary
- c. hexadecimal

Select the Numbering System of your Choice

a

Enter a Number Using the Decimal System

780

Equivalent Numbers are Binary: 1100001100 Hexadecimal: 30 Do You Wish to Continue: **YES**

Numbering Systems Supported

- a. decimal
- b. binary
- c. hexadecimal

Select the Numbering System of your Choice

(

Enter a Number Using the Hexadecimal System

B7

Equivalent Numbers are Binary: 10110111

Decimal: 183

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Numbering Systems Supported

- a. decimal
- b. binary
- c. hexadecimal

Select the Numbering System of your Choice

c Enter a Number Using the Hexadecimal System

G7

THIS IS NOT HEXADECIMAL!

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