

## Mid-Term Project Description: Dog & Cat Puzzle

### Due: Thursday, October 13<sup>th</sup> by 4:00 PM to myCourses

Consider the following “equation,” where each of the letters D, O, G, C, A, and T represents a variable that can be any of the whole numbers from zero to nine:

$$\text{DOG} + \text{CAT} = \text{TOAD}$$

Create a VI that searches and reports all of the possible solutions for this equation that do not repeat any of the digits. In other words, do not count any of the solutions where any two or more of the letter variables have the same values. This obviously excludes the trivial solution where all values are zero, but it also excludes about 75 other solutions. The number of unique solutions sought is 25, one of which is D=3, O=0, G=2, C=7, A=4, and T=1. Please observe the following specific features:

- The VI must contain a single, two-dimensional array indicator on the front panel that displays the set of solution values for all of the variables.
- Somehow document the manner in which the solution values are displayed in the array.
- The VI must contain a numeric indicator that displays the number of solutions found, within the required parameters.
- Document your code completely.
- Organize your block diagram, and follow the standard style guidelines for data flow and so forth. You will be graded on these elements.
- Remember: do not report any solutions with duplicate values for the variables.
- Some forethought will reveal a few mathematical restrictions on the values that would actually reduce the work required to find the solutions. **Do not use any of these restrictions**—create your program to search through all of the possible digits for each variable by brute force, regardless of the lack of efficiency.
- **Hint:** you will likely use a set of nested loops to solve this problem, each of which will iterate ten times to cycle through the digits 0-9. Since you have six unknowns to find, you will therefore need to test  $10^6$  total iterations to find the 25 solutions (if you follow a brute-force approach as stated).

**This is an independent project—no working together!**

**Good luck!**