CS118
Problem Solving with Conditions SOLUTION

Exercise
Prepare a solution in the Simplified Standard Format for this problem:

> Polyprotic acids (more than one acidic hydrogen) do not completely dissociate the hydrogen atoms from the compound. For our purposes, though, we will assume that they do. Provide a MATLAB program that will request the user provide the number of hydrogen atoms first – if that number is not an integer or is not between one and three, produce an error message indicating the specific error and have the program terminate. In all other cases, collect from the user the pH of the acid solution, the name of the acid in the solution, and the molecular weight of the acid. Compute the mass of acid in 100ml of solution for any acid with one to three hydrogen atoms and display the information in a table as shown in the example below.

SOLUTION:

T01: INPUT "num_H"

T02: TEST if num_H not integer, T03
  T03: OUTPUT error message for not integer

T04: TEST if num_H not between 1 and 3, T05
  T05: OUTPUT error message for not between 1 and 3

T06: TEST if num_H integer and between 1 and 3, T07-T11
  T07: INPUT "acid_name"
  T08: INPUT "MW"
  T09: INPUT "pH"
  T10: DEFINE: "g_100ml" using pH, MW, num_H
  T11: OUTPUT table using all variables

Side Note: To see how g_100ml would be computed (used variables are **bold**):

pH → $\frac{\text{mol H+}}{\text{L soln}}$ (Rearranging the definition of pH gets us: molarity H+ = $10^{-\text{pH}}$)

Then

$$\frac{\text{mol H+}}{\text{L soln}} \cdot \frac{\text{mol acid}}{\textbf{num\_H} \text{ mol H+}} \cdot \frac{\textbf{MW} \text{ g acid}}{\text{mol acid}} \cdot \frac{0.1 \text{ L soln}}{100 \text{ ml soln}} \rightarrow \frac{\textbf{g\_100ml} \text{ g acid}}{100\text{ml soln}}$$