Acetic acid (CH₃COOH) is a weak acid with an equilibrium constant \( K_a = 1.75e - 05 \). Use the techniques developed in class to find an expression for \([H^+]\) as a function of the normality, \( x \), of the weak acid solution. This means that you need to solve the quadratic equation in \([H^+]\) using the quadratic formula, leaving \( x \) as a variable in this formula.

a. In your Lab report, write the expression for \([H^+]\) as a function of \( x \) using the value of \( K_a = 1.75e - 05 \). Use Microsoft Equation 3.0 to write this expression.

b. When \( x = 0.02 \) N, find \([H^+]\) =

When \( x = 0.3 \) N, find \([H^+]\) =

When \( x = 1.05 \) N, find \([H^+]\) =

Also, when \([H^+]\) = 0.004, find \( x \) = \____ N.

c. In your Lab report, create a graph of the \([H^+]\) as a function of the normality \( x \) for \( x \in [0.001, 2] \). Be sure to properly label your axes.

d. The pH of a solution is given by

\[
pH = -\log_{10}([H^+]).
\]

When \( x = 0.02 \) N, find the pH =

When \( x = 0.3 \) N, find the pH =

When \( x = 1.05 \) N, find the pH =

Also, when the pH = 2.6, find \( x \) = \____ N.

e. In your Lab report, create a graph of the pH as a function of the normality \( x \) for \( x \in [0.001, 2] \). Be sure to properly label your axes.