Basic Acid-base Review Problems

The problems below start with strong acids and bases and then moves to weak acids and bases. Note that the approximations that avoid the quadratic formula are possible if the pH is not near 7.0. The problems employ the 5% approximation, which says that you may ignore $[H^+]$ and $[OH^-]$ from water if they are less than 5% of the final values.

You should try working the problems using the quadratic formula to prove that the answers are the same.

1. What is the pH of a 0.0115 M HCl solution?

2. Find the pH of 0.0815 M NaOH solution.

3. Find the pH of 0.00372 M Ba(OH)$_2$ solution.

4. Find the pH of 0.12 M HC$_2$H$_3$O$_2$ (Acetic acid)

5. pH of 0.255 M NH$_4$OH

The $K_b$ of NH$_4$OH is $1.78 \times 10^{-5}$.

6. Calculate the pH of 0.578 M H$_3$PO$_4$

7. What is the pH of 0.16 M HCl and 0.072 M phosphoric acid?

8. Find the pH of 1.25 M acetic acid and 0.75 M potassium acetate.

Acetic acid $k_A = 1.74 \times 10^{-5}$  \hspace{1cm} \text{pK}_A = 4.76.