Which of the following is true?

1. The pH at the equivalence point is > 7 when a weak acid is titrated with a strong base.
2. The pH at the equivalence point depends on the properties of the salt formed.
3. Na$^+$ has no effect on pH.
4. HCO$_2^-$ is a base
5. All of the above are true.
Which of the following is true?

1. The pH at the equivalence point is > 7 when a weak acid is titrated with a strong base.
2. The pH at the equivalence point depends on the properties of the salt formed.
3. \( \text{Na}^+ \) has no effect on pH.
4. \( \text{HCO}_2^- \) is a base
5. All of the above are true.
Which of the following $K_a$ expressions is correct following the addition of 0.100 mol of HCl?

1. $K_a = \left[\text{H}_3\text{O}^+\right]\left[\text{HCOO}^-\right]/\left[\text{HCOOH}\right]$
   \[K_a = \frac{(0.400 + x)(x)}{(1.10 - x)}\]

2. $K_a = \left[\text{H}_3\text{O}^+\right]\left[\text{HCOO}^-\right]/\left[\text{HCOOH}\right][\text{H}_2\text{O}]$
   \[K_a = \frac{(0.400 + x)(x)}{(1.10 - x)}\]

3. $K_a = \left[\text{H}_3\text{O}^+\right]\left[\text{HCOO}^-\right]/\left[\text{HCOOH}\right]$
   \[K_a = \frac{x^2}{(1.10 - x)}\]

4. $K_a = \left[\text{H}_3\text{O}^+\right]\left[\text{HCOO}^-\right]/\left[\text{HCOOH}\right]$
   \[K_a = \frac{(0.500 + x)(x)}{(1.00 - x)}\]
Which of the following $K_a$ expressions is correct following the addition of 0.100 mol of HCl?

1. $K_a = \frac{[H_3O^+][HCOO^-]}{[HCOOH]}$
   $K_a = \frac{(0.400 + x)(x)}{(1.10 - x)}$

2. $K_a = \frac{[H_3O^+][HCOO^-]}{[HCOOH][H_2O]}$
   $K_a = \frac{(0.400 + x)(x)}{(1.10 - x)}$

3. $K_a = \frac{[H_3O^+][HCOO^-]}{[HCOOH]}$
   $K_a = \frac{x^2}{(1.10 - x)}$

4. $K_a = \frac{[H_3O^+][HCOO^-]}{[HCOOH]}$
   $K_a = \frac{(0.500 + x)(x)}{(1.00 - x)}$
Calculate the molarity of $\text{H}_3\text{O}^+$. 

1. $3.40 \times 10^{-4} \text{ mol} / (0.02500 \text{ L}) = 1.54 \times 10^{-2} \text{ M}$

2. $3.40 \times 10^{-4} \text{ mol} / (0.02500 \text{ L} + 0.00100 \text{ L}) = 1.31 \times 10^{-2} \text{ M}$

3. $3.40 \times 10^{-4} \text{ mol} / (0.02500 \text{ L} + 0.0184 \text{ L}) = 7.83 \times 10^{-3} \text{ M}$

4. $3.40 \times 10^{-4} \text{ mol} / (0.02500 \text{ L} + 0.0184 \text{ L} + 0.00100 \text{ L}) = 7.66 \times 10^{-3} \text{ M}$
Calculate the molarity of $\text{H}_3\text{O}^+$. 

1. $3.40 \times 10^{-4}$ mol / (0.02500 L) = $1.54 \times 10^{-2}$ M

2. $3.40 \times 10^{-4}$ mol / (0.02500 L + 0.00100 L) = 1.31 x 10^{-2} M

3. $3.40 \times 10^{-4}$ mol / (0.02500 L + 0.0184 L) = 7.83 x 10^{-3} M

4. $3.40 \times 10^{-4}$ mol / (0.02500 L + 0.0184 L + 0.00100 L) = 7.66 x 10^{-3} M
\[ \text{pH} = -\log[0.00421] = 2.38 \]

(to how many sig figs?)

*hint: first ask yourself, how many sig figs are in \([H_3O^+]\)*

1. 2.4
2. 2.38
3. 2
4. 2.375
pH = -\log[0.00421] = 2.38
(to how many sig figs?)

*hint: first ask yourself, how many sig figs are in [H₃O⁺]*

1. 2.4
2. 2.38
3. 2
4. 2.375
0.75 x 10^{-3} \text{ moles of OH}^- \text{ reacting with} 
2.5 x 10^{-3} \text{ moles of HCOOH produces how} 
\text{many moles of HCO}_2^-? 

1. 2.5 x 10^{-3} - 0.75 x 10^{-3} = 1.75 x 10^{-3} 
2. 0.75 x 10^{-3} 
3. 2.5 x 10^{-3} 
4. Depends on the K_b of HCO}_2^- 
5. Depends on the K_a of HCO}_2^-
0.75 x 10^{-3} \text{ moles of } OH^- \text{ reacting with } 2.5 \times 10^{-3} \text{ moles of } HCOOH \text{ produces how many moles of } HCO_2^- ?

0% 1. 2.5 \times 10^{-3} - 0.75 \times 10^{-3} = 1.75 \times 10^{-3}

0% 2. 0.75 \times 10^{-3}

0% 3. 2.5 \times 10^{-3}

0% 4. Depends on the K_b of HCO_2^- 

0% 5. Depends on the K_a of HCO_2^-