Name _____ TA _____

R number _____ Laboratory Date _____ Section _____

$$[HCl]_{add} = [HCl]_{stock} \times \frac{V_{stock}}{V_{tot}}$$ $[HCl]_{add}$ = ____ *M*

b. Calculate $[NaOH]_{add}$ using $[NaOH]_{stock}$, V_{stock}, and V_{tot} from **D**II.3a, **D**II.3b, and **D**II.3c, respectively in:

$$[NaOH]_{add} = [NaOH]_{stock} \times \frac{V_{stock}}{V_{total}}$$ $[NaOH]_{add}$ = ____ *M*

3. Distilled water: Theoretical pH values
   a. For 0 mL acid/base addition: pH = 7.0
   b. Acid addition: determine pH by the following three-step calculation using the total added volume of acid solution (V_{acid} in mL) from column 2 of Data Table III:
      i. $n_{H_3O^+} = V_{acid} \times \frac{1\,L}{10^3\,mL} \times [HCl]_{add}$
      ii. $[H_3O^+] = \frac{n_{H_3O^+}}{50\,mL + V_{acid}} \times \frac{10^3\,mL}{1\,L}$
      iii. pH = -log([H_3O^+])
   c. Base addition: determine pH by the following four-step calculation using the total added volume of base solution (V_{base} in mL) from column 2 of Data Table IV:
      i. $n_{OH^-} = V_{base} \times \frac{1\,L}{10^3\,mL} \times [NaOH]_{add}$
      ii. $[OH^-] = \frac{n_{OH^-}}{50\,mL + V_{base}} \times \frac{10^3\,mL}{1\,L}$
      iii. pOH = -log([OH^-])
      iv. pH = 14 – pOH

4. Buffer solution: Theoretical pH values
   a. For 0 mL acid/base added: use eq. (6) with n_{A^-} and n_{HA} from **A**II.1a-b, respectively, and $n_{BA} = 0$
   b. Acid addition in the buffering region ($n_{A^-} > n_{BA}$): use the lower sign version of eq. (6) with n_{A^-} and n_{HA} from **A**II.1a-b, respectively, and $n_{BA} = n_{H_3O^+}$ from **A**II.3b(i).
   c. Base addition in the buffering region ($n_{HA} > n_{BA}$): use the upper sign version of eq. (6) with n_{A^-} and n_{HA} from **A**II.1a-b, respectively, and $n_{BA} = n_{OH-}$ from **A**II.3c(i).