1) Acid-Base reactions: Provide the products for each of the following reactions. Write out the mechanism for each reaction; use curved arrows to show the flow of pairs of electrons; show all formal charges.

\[
\text{H}_3\text{C} \text{OH} + \text{HCl} \leftrightarrow \text{H}_3\text{C} \text{OH}_2^- + \text{Cl}^-
\]

\[
\text{H}_3\text{C} \text{OH}^- + \text{OH} \leftrightarrow \text{H}_3\text{C} \text{OH} + \text{H}_2\text{O}
\]

\[
\text{H}_3\text{C} \text{NH}_2 + \text{HCl} \rightarrow \text{H}_3\text{C} \text{NH}_3 + \text{Cl}^-
\]

\[
\text{CH}_2\text{OH} + \text{HCl} \leftrightarrow \text{CH}_2\text{OH}^- + \text{Cl}^-
\]
2) Alkenes as "bases": Draw the carbocation(s) from the protonation of each alkene. If there are two possible carbocations, indicate which one is more stable.

Both are 2° & equal stability

3° Carbocation - more stable

3° Carbocation - more stable