1. (a) Give the products of the following reaction:

\[
\text{NaNH}_2 \rightarrow \text{NH}_3 \\
\text{NH}_3 \\
-33 \, ^\circ \text{C}
\]

(b) Which product might you guess would form in the greatest amount? Why?

(c) Draw the structure(s) of the reactive intermediate(s) that form(s) in the reaction.
2. (a) Draw all the isomeric anhydrides with formula C$_6$H$_{10}$O$_3$.

(b) If you were given an unknown sample of an anhydride with the formula above (C$_6$H$_{10}$O$_3$), which form of spectroscopy would you choose to easily identify the isomer you were given? Explain.

(c) Take any one of the anhydrides you drew in part a and draw as many resonance structures for it that you can. Classify each as "major", "minor", or "very minor" in terms of their overall contribution to the resonance hybrid.
3. Draw a complete mechanism (i.e. "e− pushing" with arrows!) for the following nucleophilic acyl substitution reaction:

\[
\begin{align*}
\text{CH}_3\text{COCH}_2\text{CH}_3 & + \text{NH}_3 & \rightarrow & \text{CH}_3\text{CNH}_2 & + & \text{CH}_3\text{CH}_2\text{OH}
\end{align*}
\]

4. Predict the major organic product for each of the following reactions:

\[
\begin{align*}
\text{(CH}_3\text{)}_3\text{CCl} & + \text{CH}_3\text{CH}_2\text{OH} & \rightarrow & \\
\text{CH}_3\text{COCCH}_3 & + 2 \text{CH}_3\text{NH}_2 & \rightarrow & \\
\text{H}_2\text{O} & \text{H}_3\text{O}^+ & \rightarrow & 
\end{align*}
\]