1. The pKa of most primary and secondary amines is around 11. Explain what that means in terms of what fraction of molecules is protonated versus unprotonated.

\[
\text{pKa} \approx 10 \\
K_a = 10^{-11} = \frac{[\text{products}]}{[\text{reactants}]} = \frac{[\text{NR}_2\text{H}^+]}{[\text{NR}_2\text{H}_2]} \\
\text{A huge predominance of the molecules are in the protonated form, and very very few are in the deprotonated form.}
\]

2. What would be the product of this Friedel-Crafts acylation?

\[
\text{O} \quad \text{Cl} \\
\text{+} \\
\text{1. BF}_3 \text{ (Lewis acid)} \\
\text{2. H}_2\text{O goes to 2 position} \\
\text{O} \quad \text{C - CH}_3
\]

How would the product be different if the starting material was pyridine instead of furan?

\[
\text{NR} \\
\text{1. BF}_3 \text{ (Lewis acid)} \\
\text{2. H}_2\text{O} \\
\text{very unreactive, especially to F - C!}
\]