Deadline for CH310N HW 4, Due: Oct 10 3:00 PM

Mechanism: Provide a mechanism for the following transformation. Show all important flows of electrons, charges and intermediates. Where indicated, (in the structure-n-a- box)-draw the intermediates.

\[
\begin{align*}
\text{H}_3\text{C} & \quad \text{OCH}_3 \\
\text{+} & \quad \text{HN} \quad \text{TsOH}\text{ (cat)} \quad \text{heat} \\
\text{piperidine} & \quad \text{O} \quad \text{H}_3\text{C} \quad \text{OCH}_3 \\
\text{+ CH}_3\text{OH} & 
\end{align*}
\]

- **Protonate the ester**
- **Show the nucleophilic attack by piperidine**
- **Tetrahedral intermediate with N-protonated**
- **Intramolecular proton transfer**
- **Show the loss of methanol and the formation of the amide**
- **Tetrahedral intermediate with O-protonated**
Retrosynthesis: Each of the following \( \alpha, \beta \)-unsaturated ketones can be produced from an aldol condensation-dehydration reaction. Provide the starting material(s) for the preparation of each compound.

A)

B)

C)