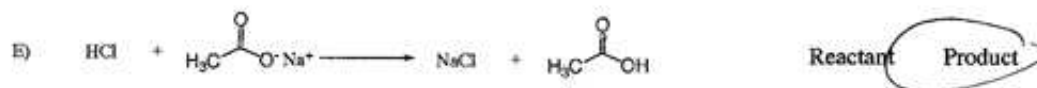
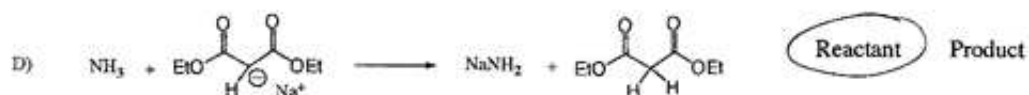
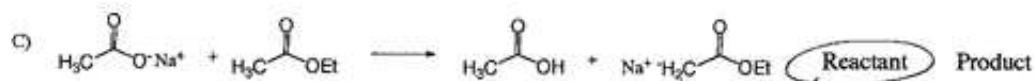
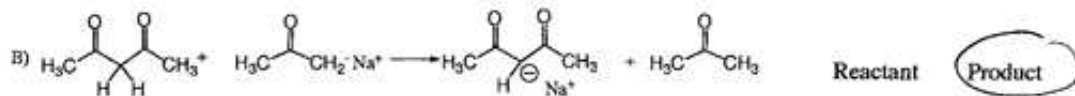
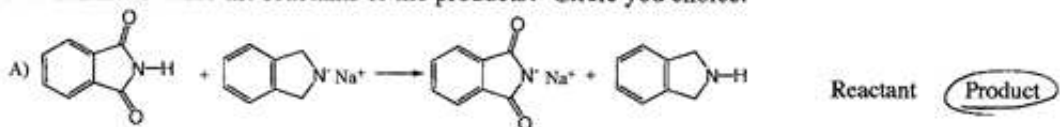
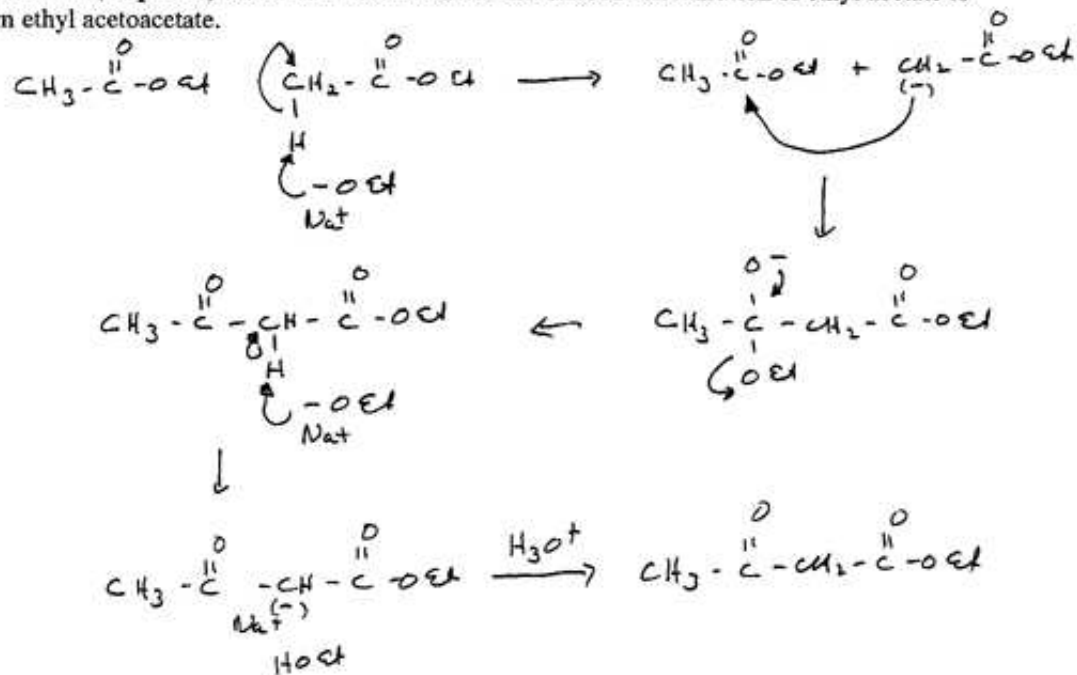


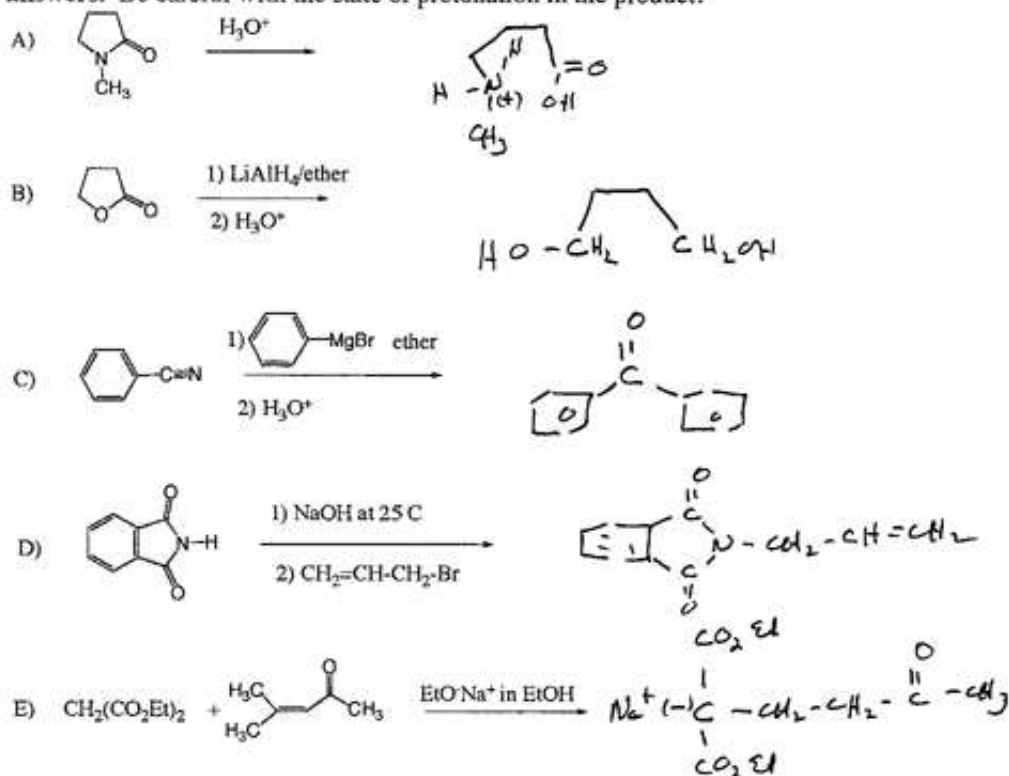
Problem 1. (15 points) For the following proton transfer reactions does the equilibrium for the reaction lie towards the reactants or the products? Circle your choice.



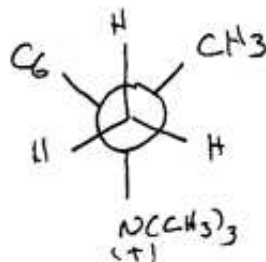
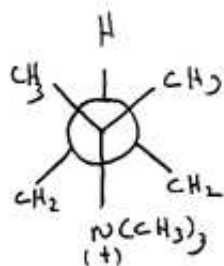
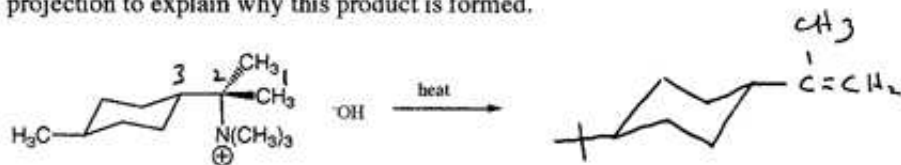
Problem 2. (10 points) Given the mechanism for the Claisen condensation of ethyl acetate to form ethyl acetoacetate.



Problem 3. (20 points) Give the products for the following reactions. Please circle your answers. Be careful with the state of protonation in the product!



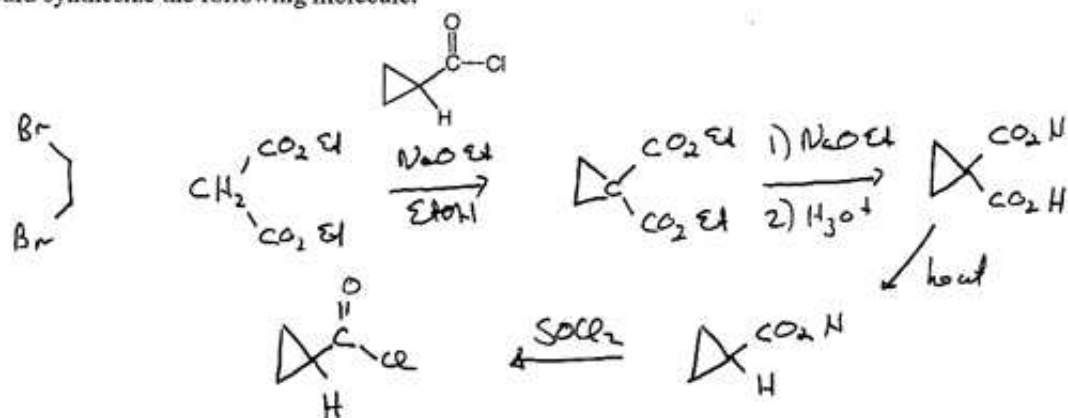
Problem 4. (10 points) Give the major product for the following reaction. Give the Newman projection to explain why this product is formed.



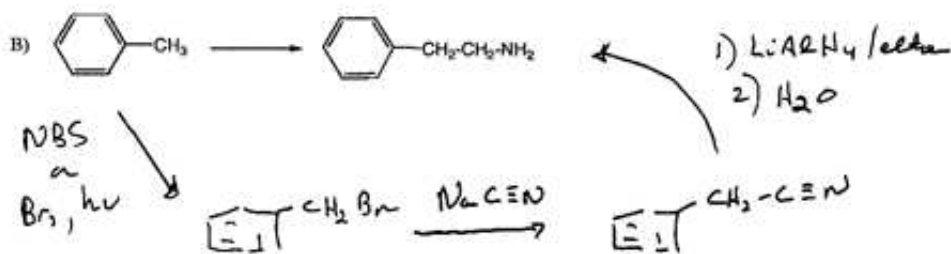
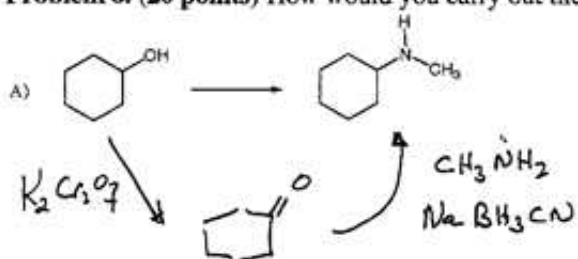
Down 2-3 - strong steric repulsion of $\text{N}(\text{CH}_3)_3$ with C_6 ring

Down 1,2 - no steric problems

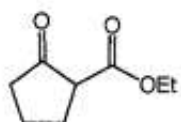
Problem 5. (15 points) Starting with 1,2 dibromoethane and diethylmalonate, show how you would synthesize the following molecule.



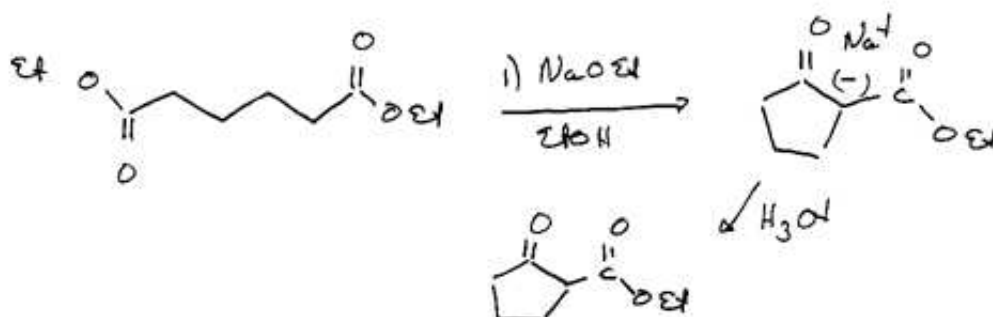
Problem 6. (20 points) How would you carry out the following transformations?



Problem 7. (10 points) Consider the following molecule:



A) How would you synthesize this molecule using the Dieckmann reaction?



B) How would you synthesize this molecule by the acylation of a ketone?

