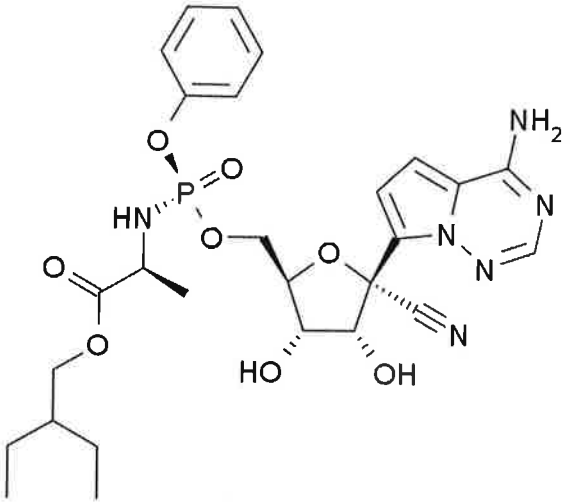
Chemistry 110B
SECOND EXAM
February 28, 2020

Name (print) KEY

Note: Your exam should consist of 5 pages including this cover sheet. Skim the entire exam and solve the easiest problems first.

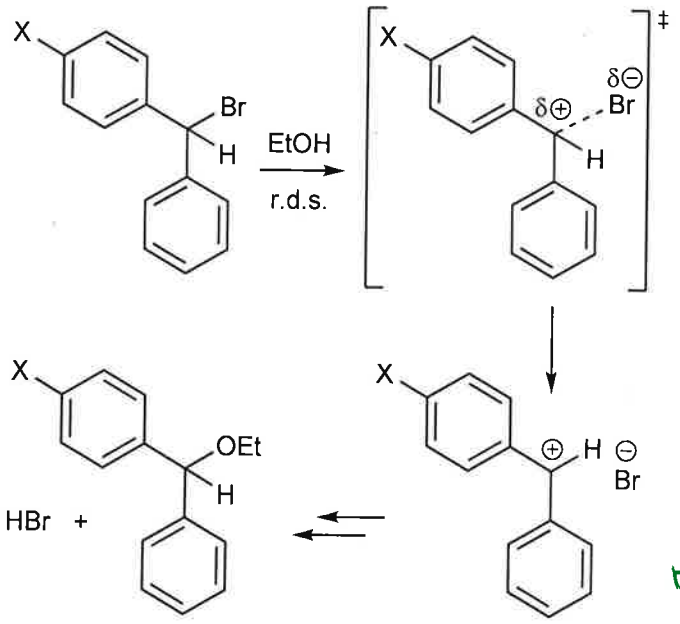


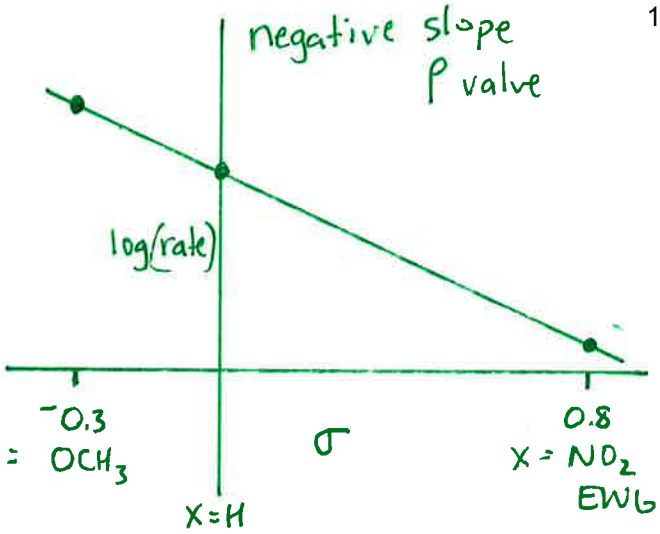
Organic chemistry in the news: The drug maker Gilead Sciences is expanding its clinical trials of the antiviral drug **remdesivir** as a possible coronavirus treatment into several countries outside China, the company announced on Wednesday. The drug is still experimental, not yet approved to treat any disease. There are no approved treatments for illnesses caused by coronaviruses, including the new one, known as Covid-19 (from a February 26 New York Times article written by Denise Grady).

DO NOT OPEN THIS EXAM UNTIL INSRUCTED TO DO SO

1. **Sketch a Hammett plot** consistent with the mechanism proposed below. Be sure to label the x and y axes properly and help the reader understand σ and ρ values (hint: don't worry about precise values of σ, use EDG/EWG and a few functional group examples to make your point. **In a sentence**, summarize what the plot is telling you about the nature of the reaction. 2

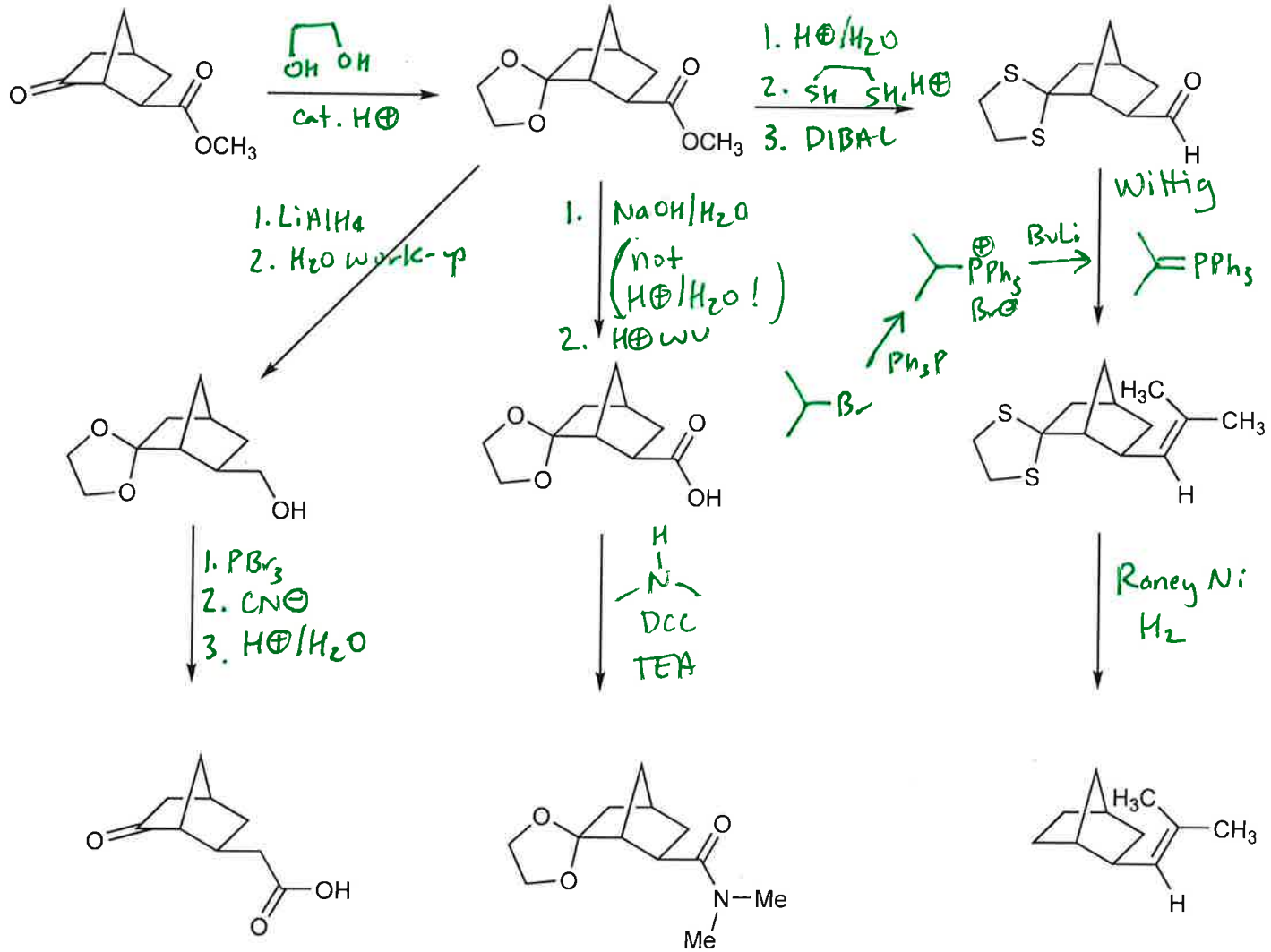
10 pts



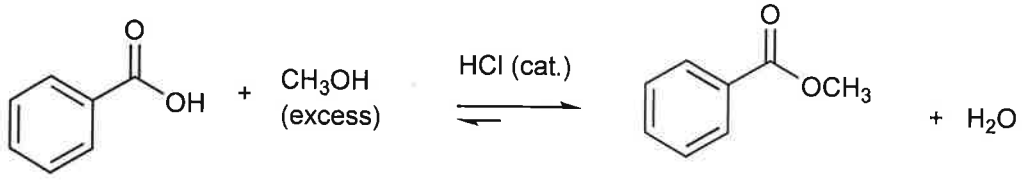


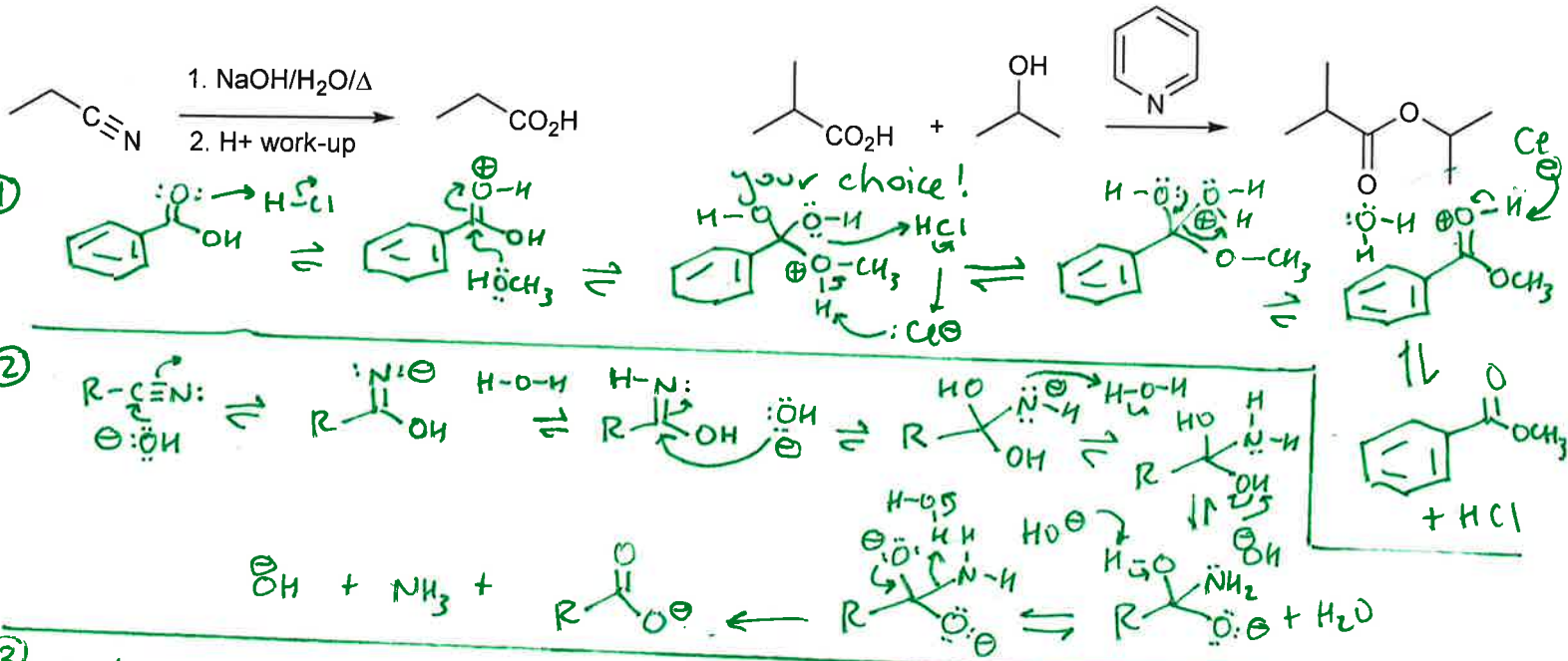
reaction r.d.s. involves growing (+) charge, rates enhanced by EDGs and slowed by EWG.

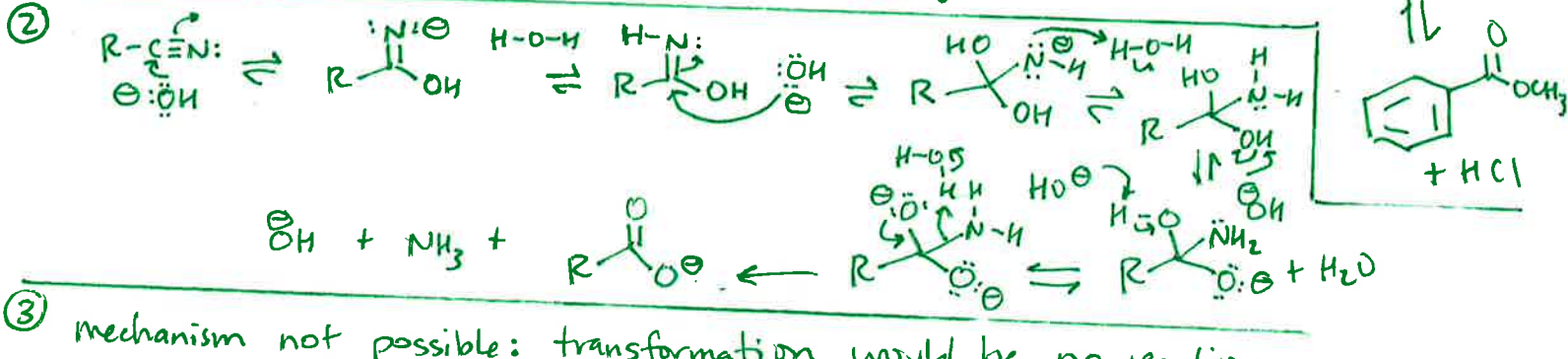
2. The following synthesis has been reported in the literature. Suggest reagents or a series of reagents appropriate for each step. No mechanisms. 4 pts each, 32 pts total.



3. Provide a detailed mechanism for **one** of the following tranformations . 8 pts

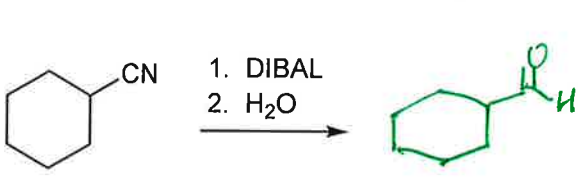


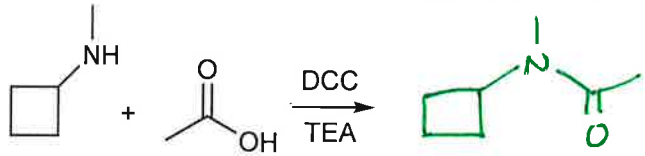


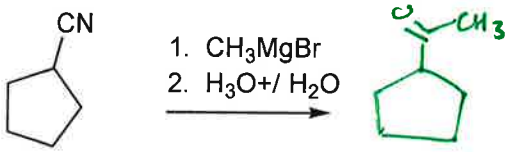


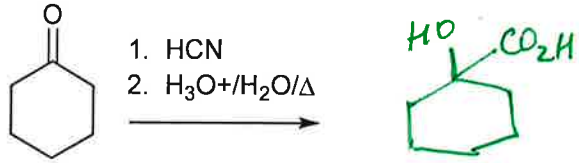
③ mechanism not possible: transformation would be no reaction

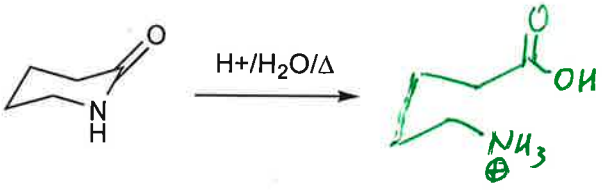
4. Write structural formulas for the major organic product from each of the following reactions. 4 pts each, 24 pts total.

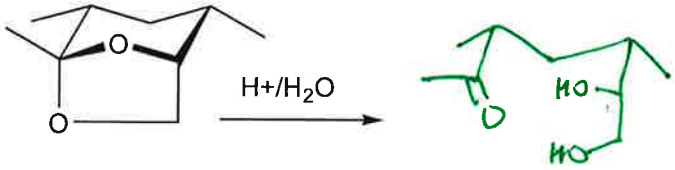






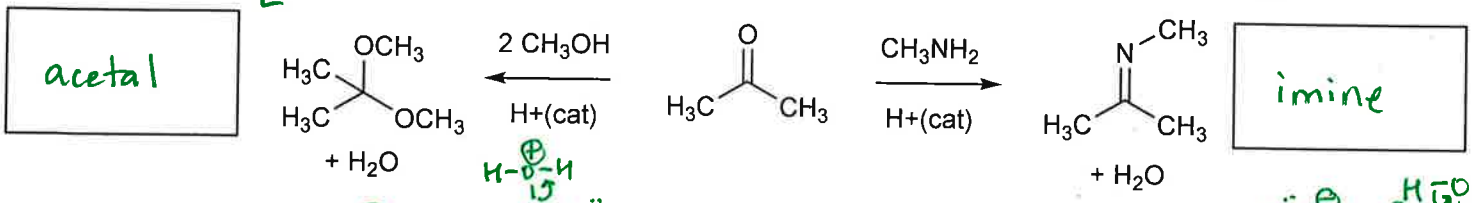


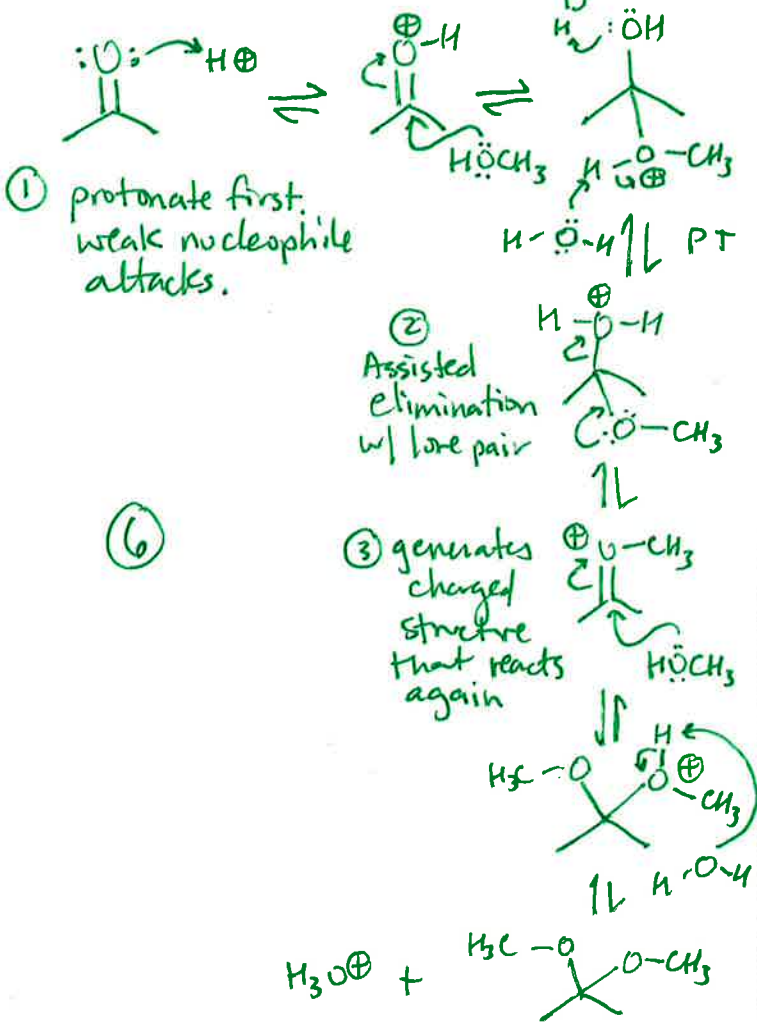


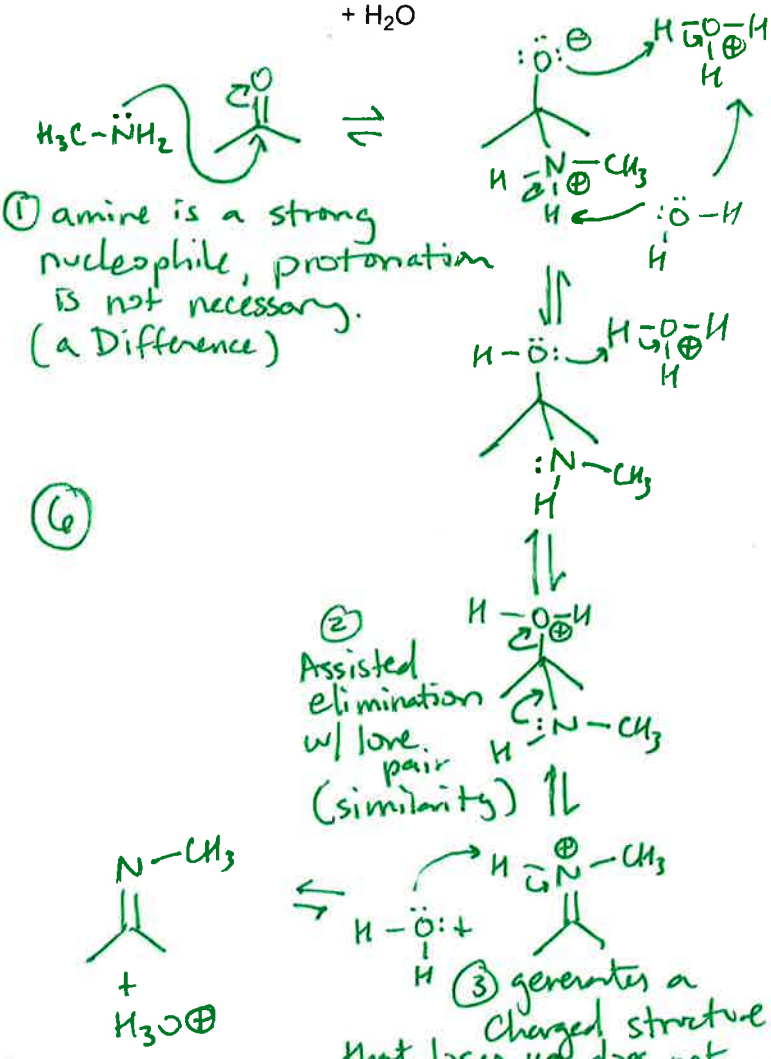


5. Throughout this material we have tried to find common mechanistic pathways in seemingly different chemical reactions. It's been suggested that the two transformations shown below share a similar set of steps--write down the mechanisms for each and annotate any points of similarity. Of course, the products look pretty different (provide their functional group names in the boxes), so also annotate key mechanistic differences between the two processes. 16 pts

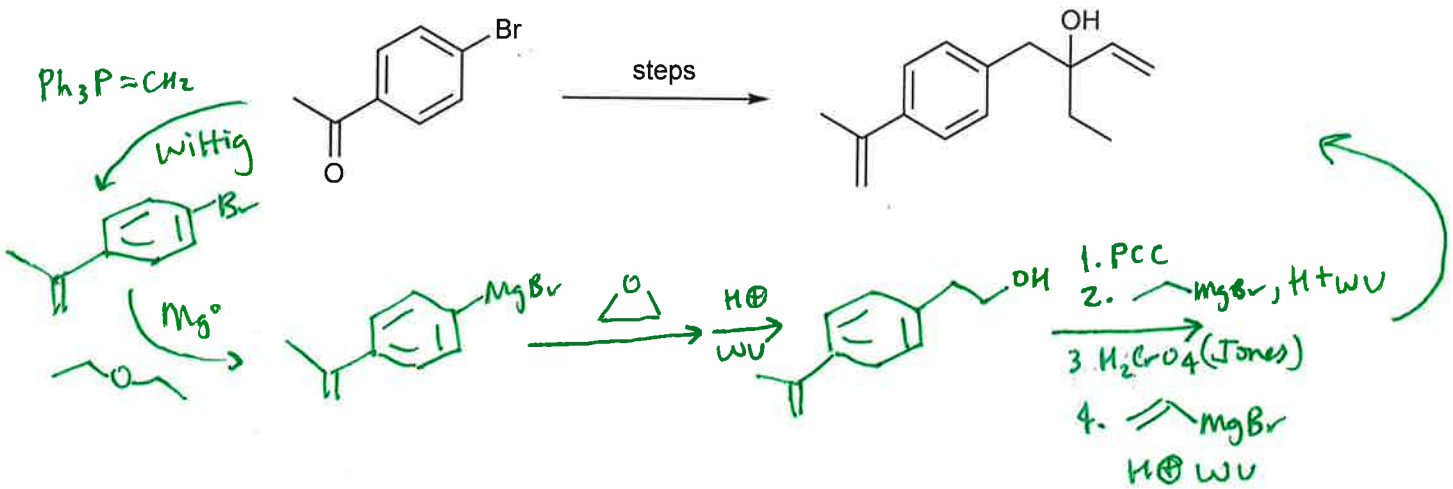
2 2







6. Provide reagents that would accomplish this synthesis. Indicate the series of reactions you intend to use by writing the reagents over an arrow for each step. Mechanisms not required. 10 pts



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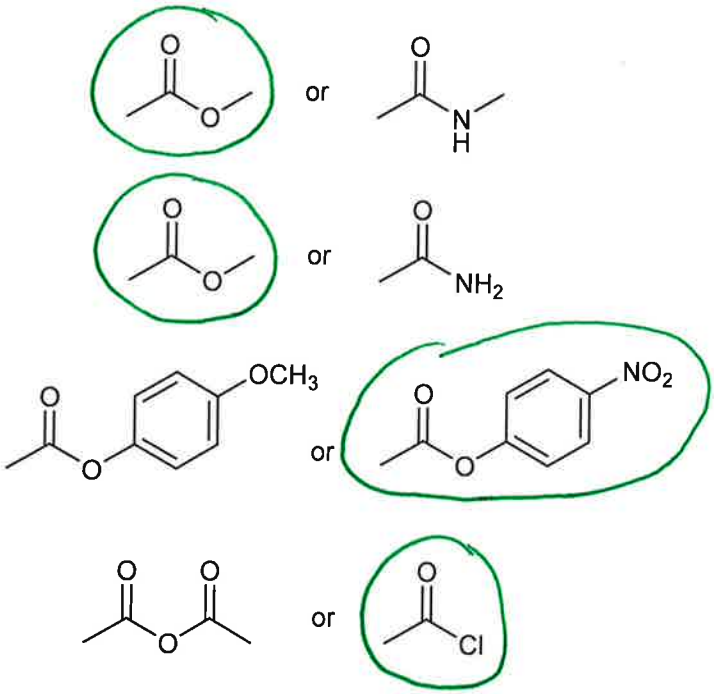
Page	Points	Score
2	42	
3	32	
4	26	
bonus	2	
Total	100	



Bonus: Circle the compound in each pair that is more reactive in nucleophilic addition-elimination reactions. 2 pts = all four correct. 1 pt = fewer than four correct.