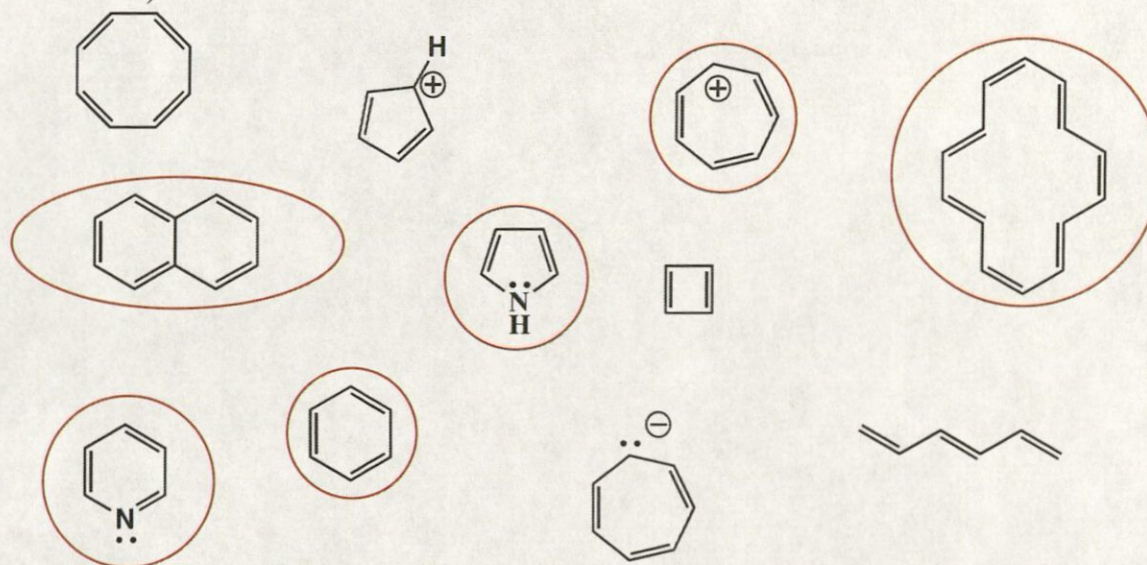
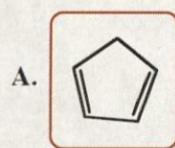


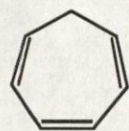
1. Below, circle all the molecules that can be called aromatic. (Do not make any mark on, around, or beside any molecule below that cannot be considered aromatic.)



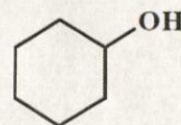
2. For each pair of molecules, circle the one that is more acidic.



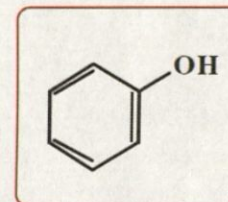
or



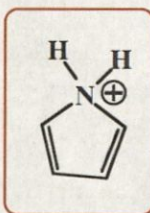
B.



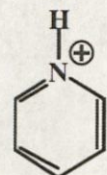
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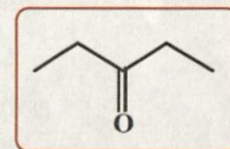
C.



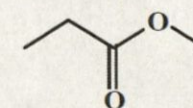
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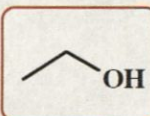
D.



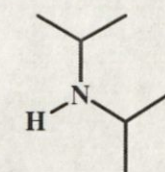
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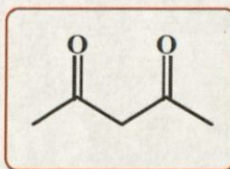
E.



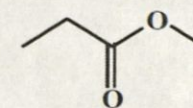
or



F.



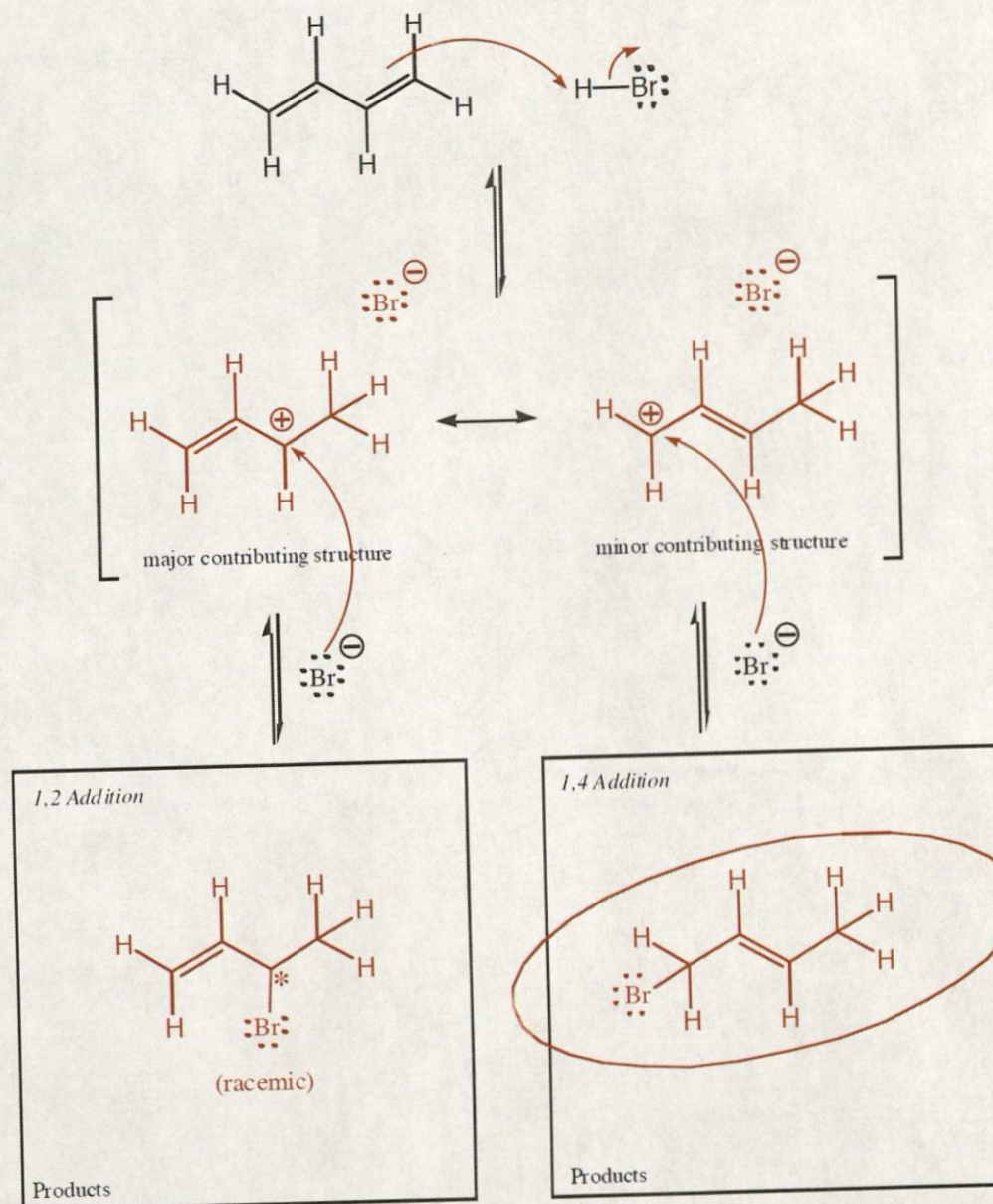
or



Signature _____

Pg 7 _____(22)

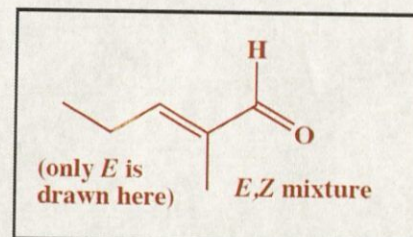
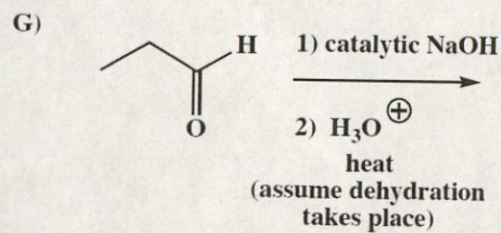
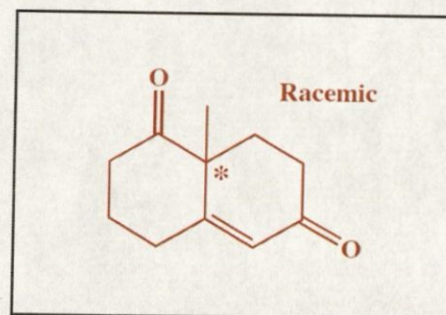
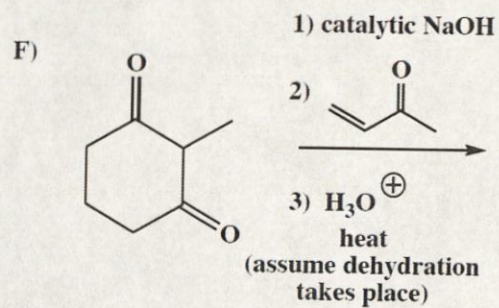
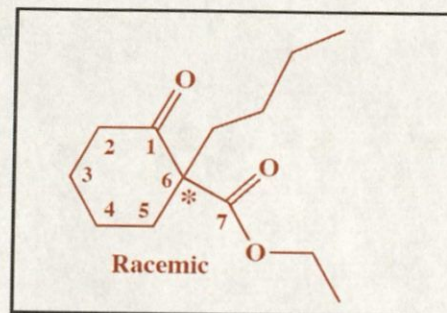
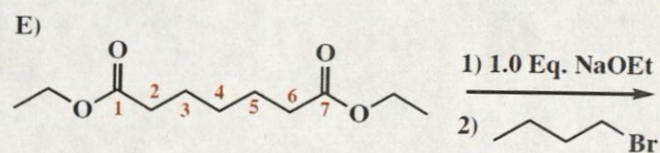
12. (18 pts) Complete the mechanisms below that shows how HBr adds to a conjugated diene to give both 1,2 addition and 1,4 addition. Use arrows to show the movement of all electrons, and be sure to draw all lone pairs of electrons and all formal charges. If a racemic product is formed, just put an asterisk (*) next to the chiral center and write "racemic" under it.



Notice this

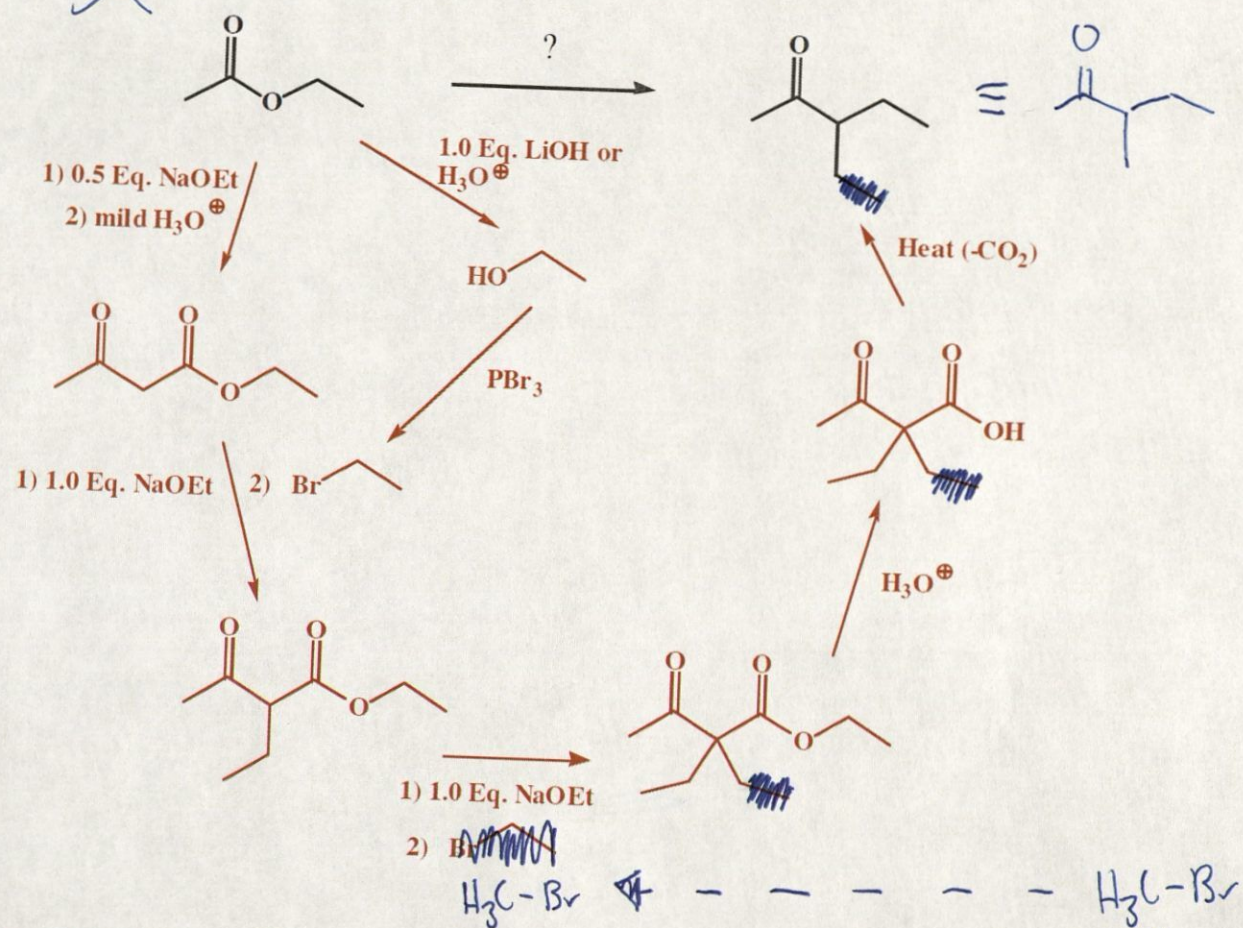
(4 pts) Draw a circle around the product you drew that will predominate when the reaction is run under conditions of **thermodynamic control**.

10. (3 or 5 pts each) For the following reactions, draw the predominant product or products. When a new chiral center is created, mark it with an asterisk (*) and if a racemic mixture is produced, you must write "racemic" under your structure. If an E,Z mixture is produced as the result of a dehydration step, write "E,Z mixture", but you only have to draw one isomer, not both. These directions are different than you may have seen before, and are intended to make it easier for you. You should read them again so you know what we want.

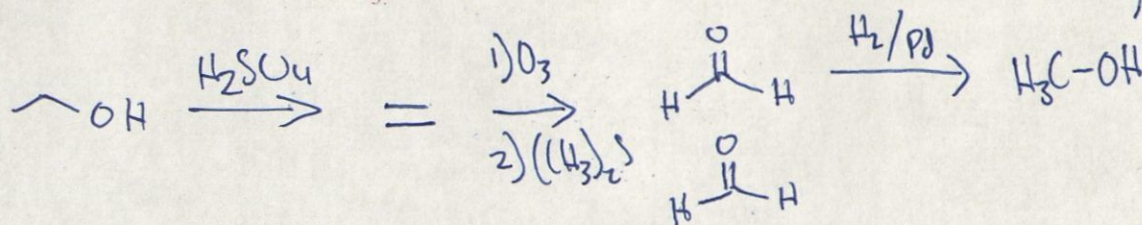


15. Using any reagents turn the starting material into the indicated product. All the carbons in the product must come from the given starting material or starting materials. Draw all molecules synthesized along the way. When in doubt, draw the molecule!

B) (16 pts)

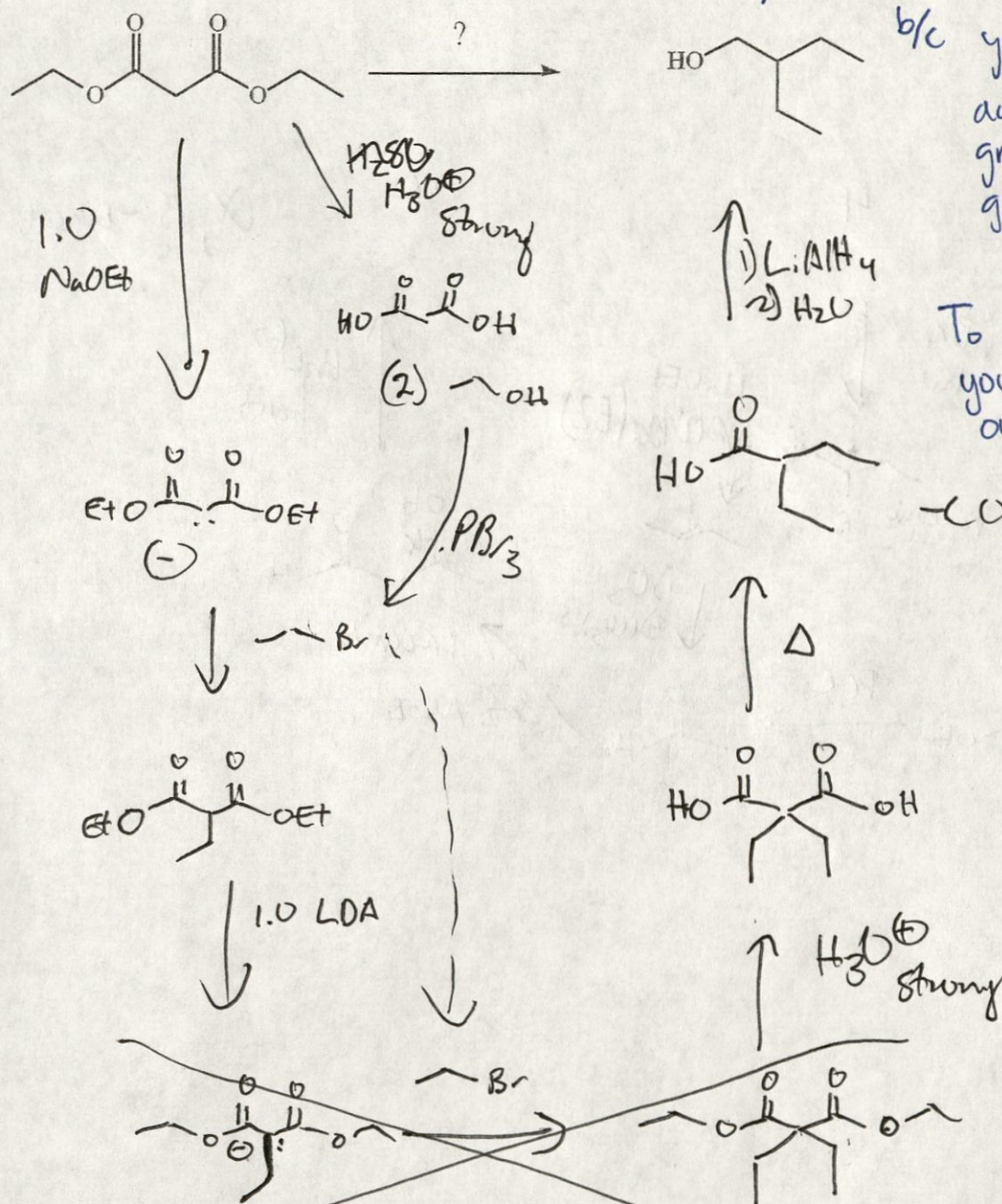


Recognize this as the methyl ketone (KRE) product of an acetoester synthesis. Recognize also that acetoester is the product of a Claisen reaction derived from the starting ethyl acetate. Recognize also that the required two carbon unit needed for alkylation can be derived from hydrolysis of the starting ethyl ester, followed by reaction with PBr_3 .



15. Using any reagents turn the starting material into the indicated product. All the carbons in the product must come from the given starting material or starting materials. Draw all molecules synthesized along the way. When in doubt, draw the molecule!

C) (16 pts)



Note: you can't complete the synthesis below in our class

b/c you can only add a methyl group after one group has already been added.

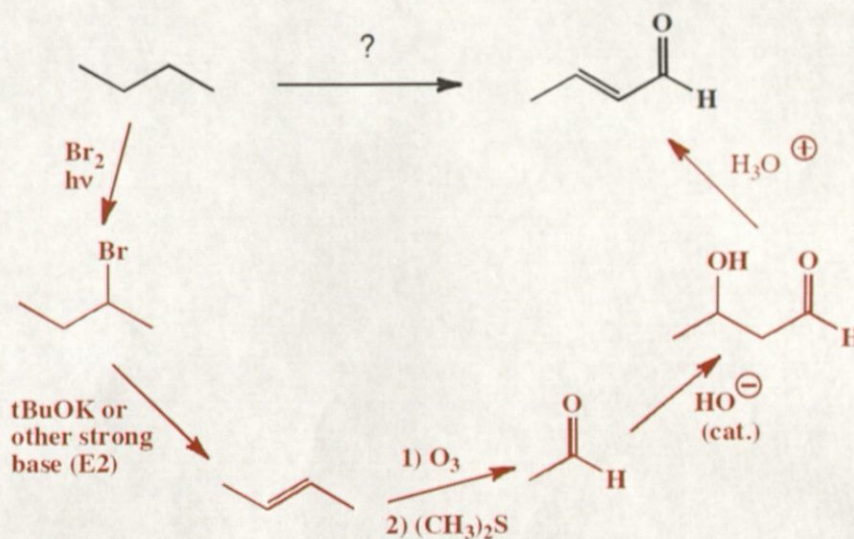
To work this problem, you could assume, only for this example this one time, you could add an ethyl group ^{2nd}. This was included just to help you practice.

Can only add -Me group 2nd

If you could add -Et group 2nd, this would work as shown above

14. (10 pts) Using any reagents turn the starting material into the indicated product. All carbon atoms must come from the starting material. Draw all molecules synthesized along the way. When in doubt, draw the molecule! Label all chiral centers with an asterisk (*) and make sure to right "Racemic" where appropriate.

Remember, all of the carbons of the product must come from the given starting material.



Recognize the final product as resulting from dehydration of the aldol product (β -hydroxy aldehyde). The required aldehyde for the aldol reaction is acetaldehyde, which can be derived from the ozonolysis of 2-butene. **Recognize** that 2-butene can be derived from the starting material through the sequence of free radical halogenation followed by E2 elimination in base.