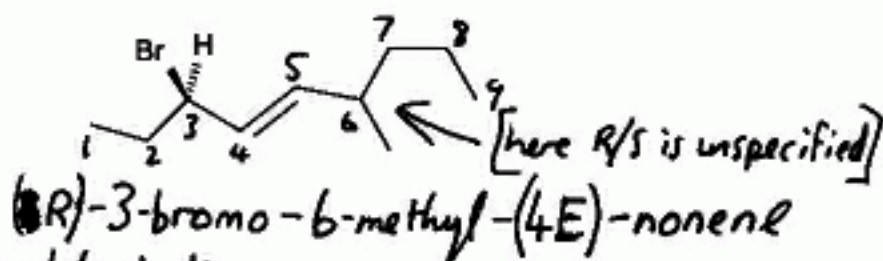
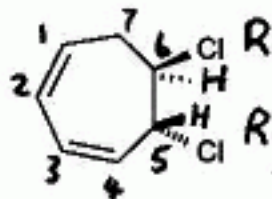


YOUR NAME ANSWER KEY

360 points total.

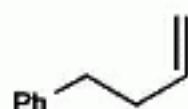
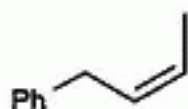
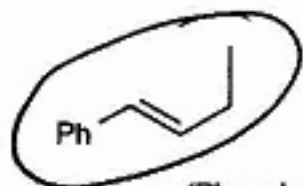
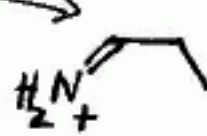
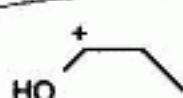
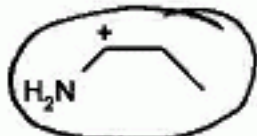
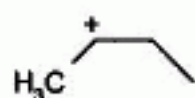
1. (22 points) Give a systematic name for each of the following compounds:



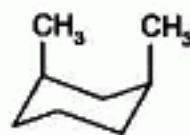
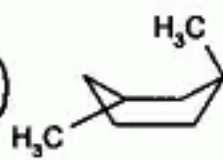
$(5R, 6R)$ -5,6-dichloro-1,3-cycloheptadiene

(R) -3-bromo-6-methyl-(4E)-nonene

2. (24 points) Which is the most stable from each set of three related structures?

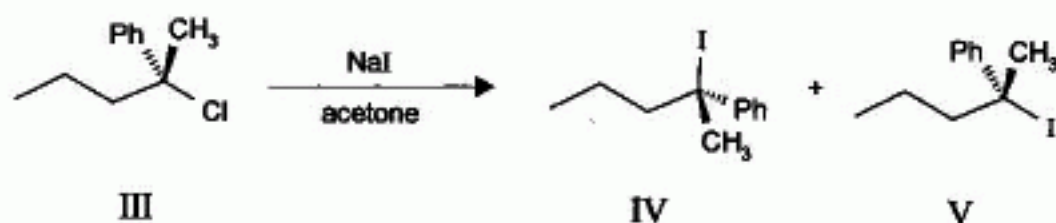
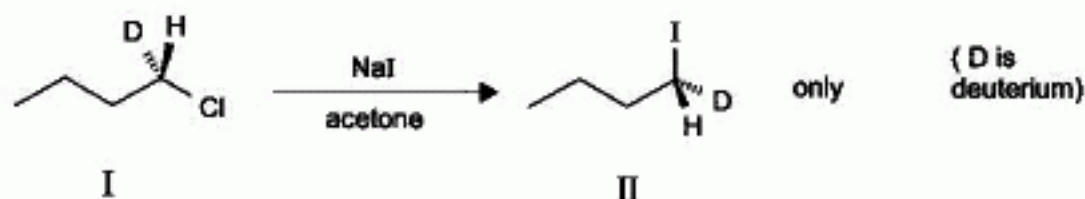


(Ph = phenyl)
conjugated

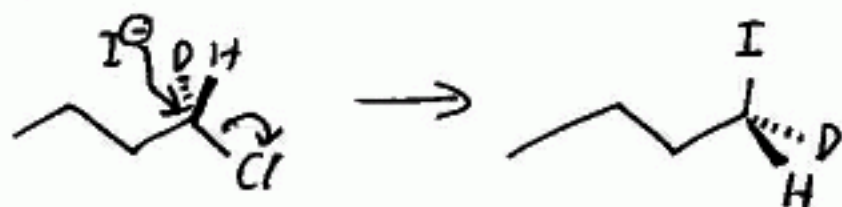


Chair, both axial

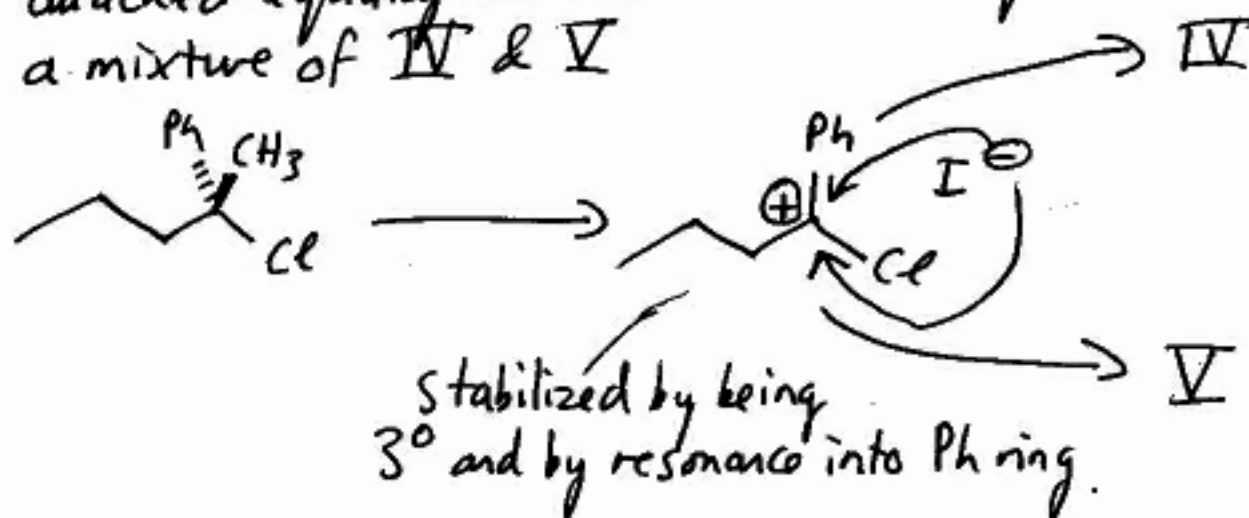
3. (20 points) Explain why compound I gives only one enantiomer of the alkyl iodide II when treated with NaI in acetone, whereas compound III gave a mixture of enantiomers IV and V in the same reaction.



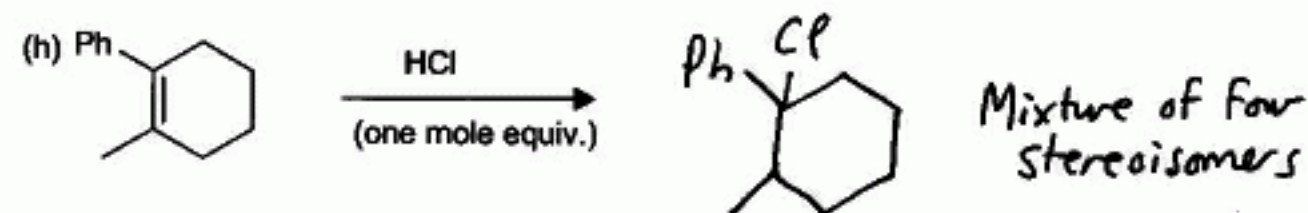
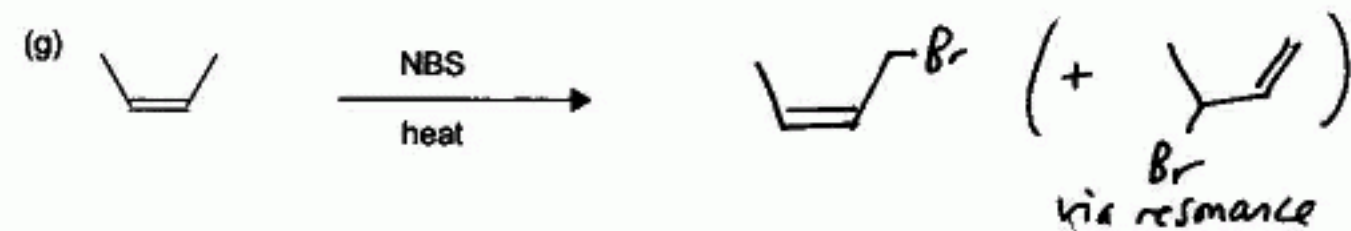
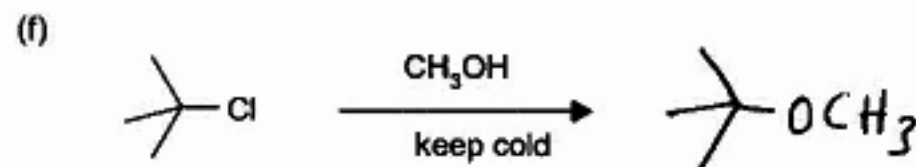
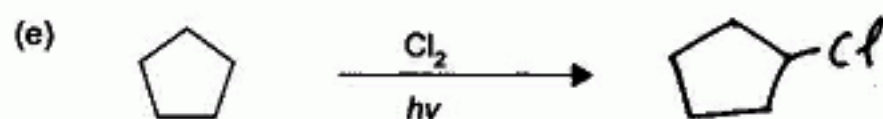
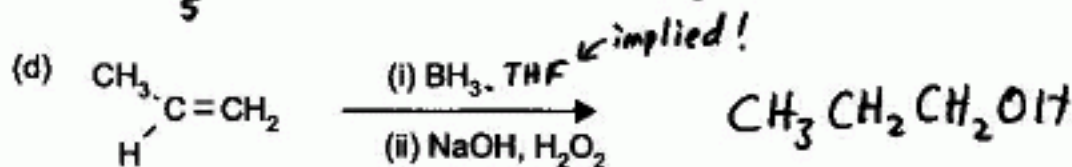
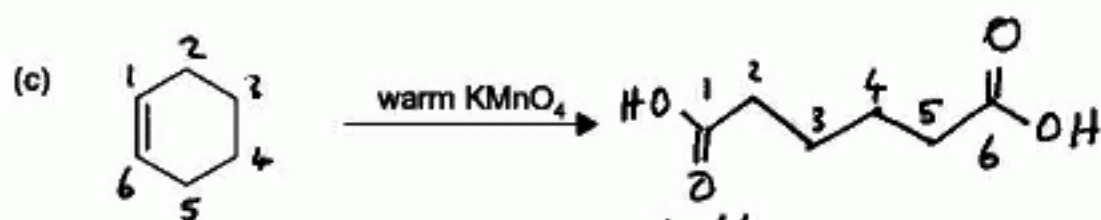
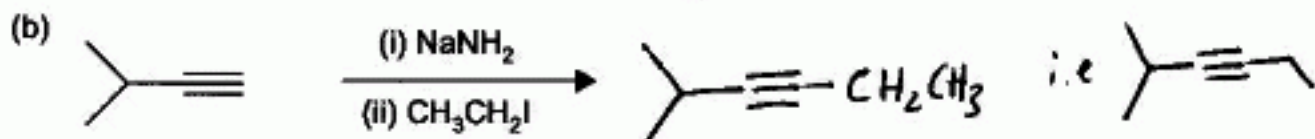
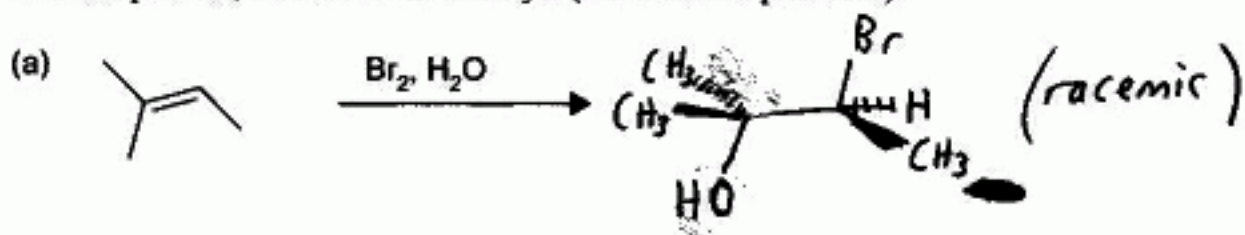
Compound I reacts purely via S_N2 , since it is 1° . S_N2 goes via back side attack in a single step, with inversion at the electrophilic carbon.



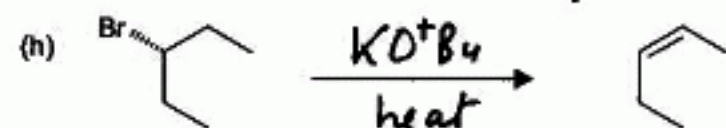
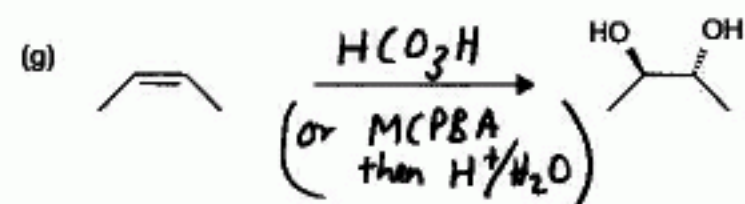
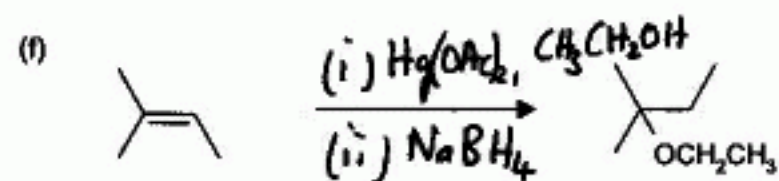
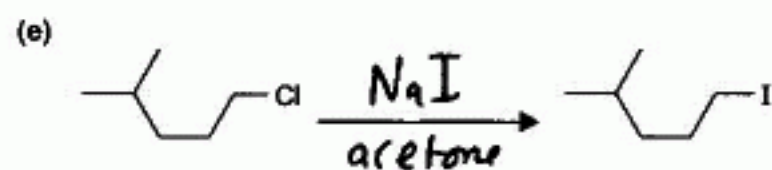
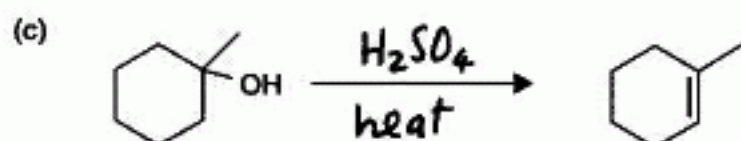
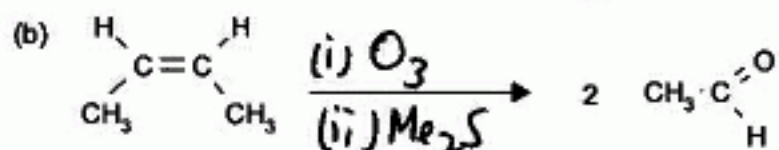
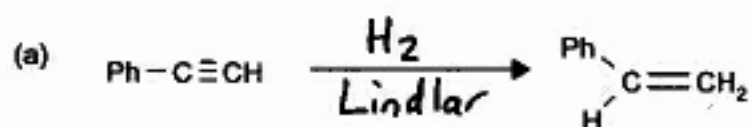
Compound III is 3° and reacts via S_N1 , forming an achiral carbocation intermediate. This carbocation can be attacked equally well from either side by the I^- , giving a mixture of IV & V.



4. (81 points) Predict the major product(s) of the following reactions. If you show more than one product, indicate which is major (if this can be predicted).



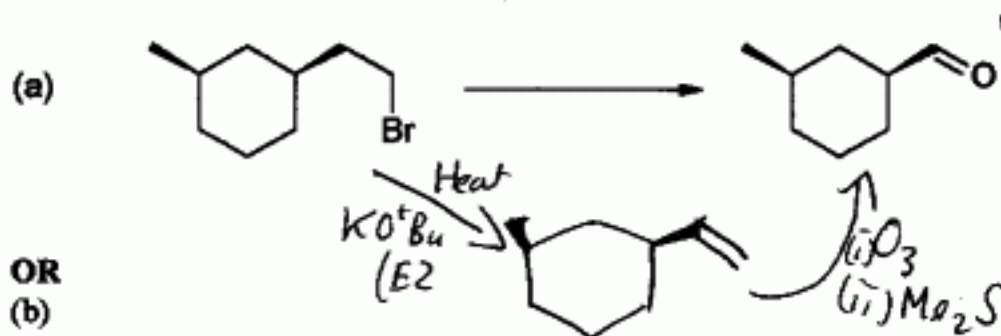
5. (81 points) What reagent(s) might you use in order to effect the following transformations in a practicable manner?



6. (25 points) Show how you might perform either one of the two-step syntheses shown below. You must use the starting material given as your sole source for all carbons in the product (you need not synthesize reagents which are not incorporated, however).

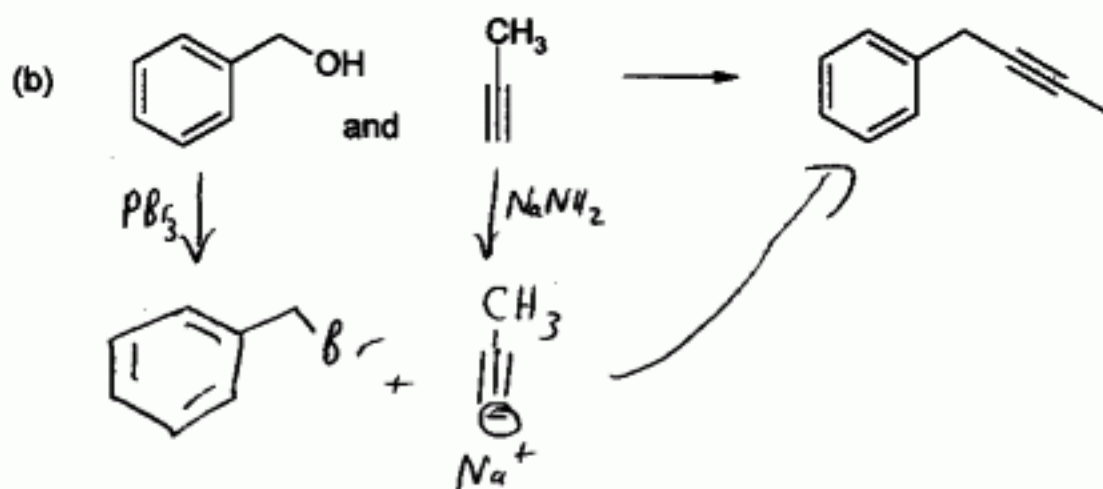
EITHER

(a)

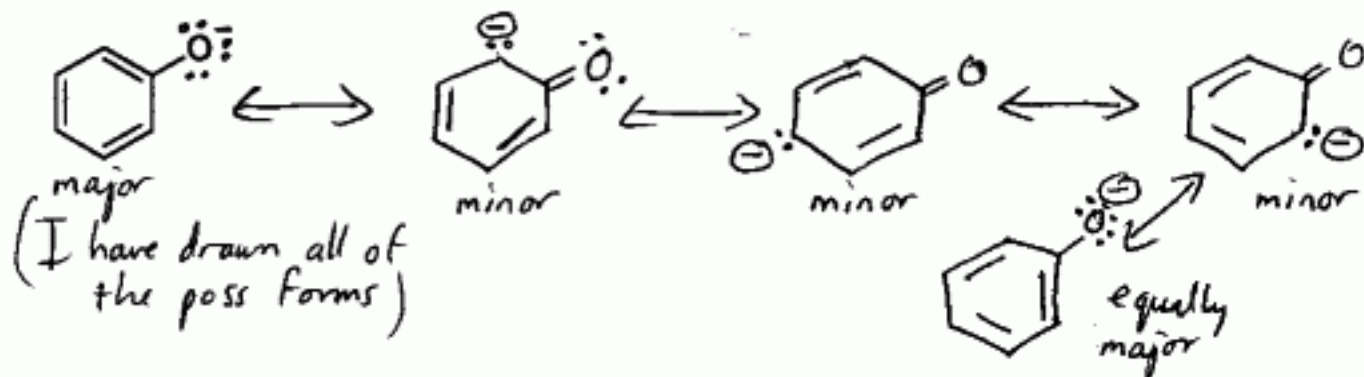


OR

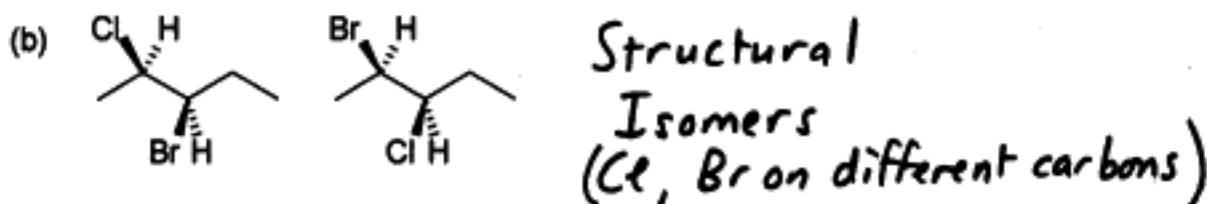
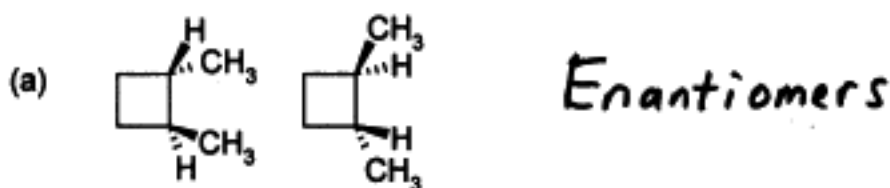
(b)



7. (16 points) Draw resonance forms for the structures given, and indicate if it is major, minor or the same in importance, compared with the form given:



9. (18 points) Indicate the relationship between the following compounds as structural isomers, diastereomers, enantiomers, resonance forms, or identical:



10. (24 points) Which of the following pairs of reactions would be expected to be faster? Give a brief explanation of your answer in each case.

