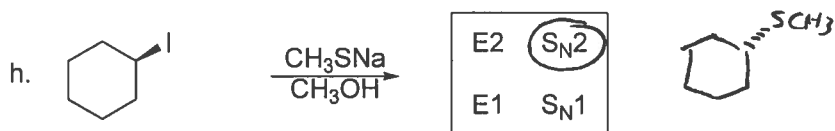
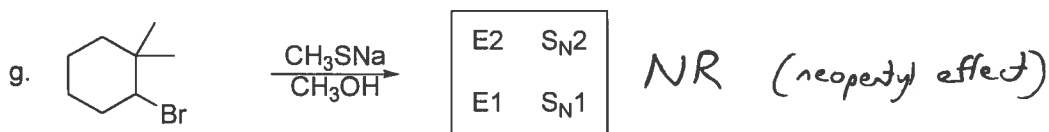
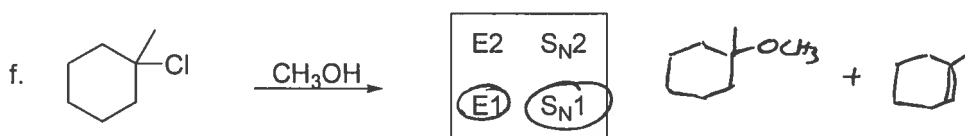
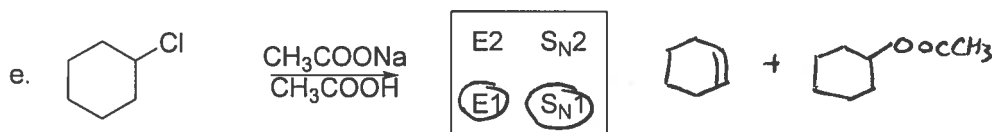
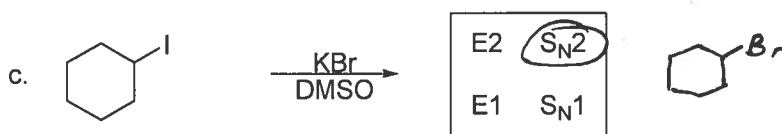
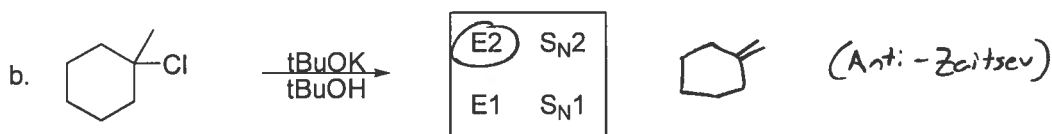
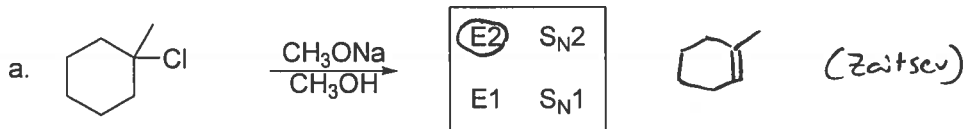
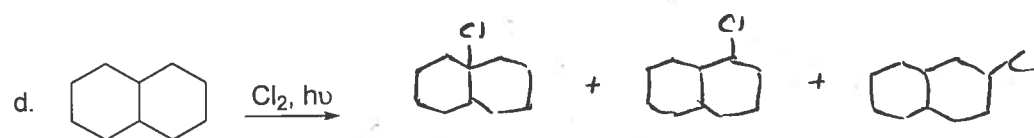
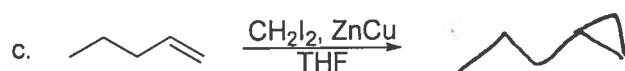
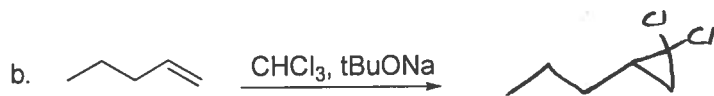
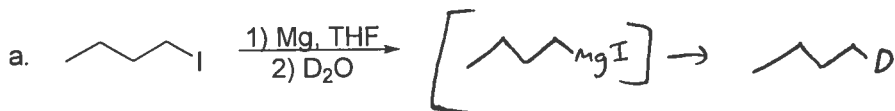




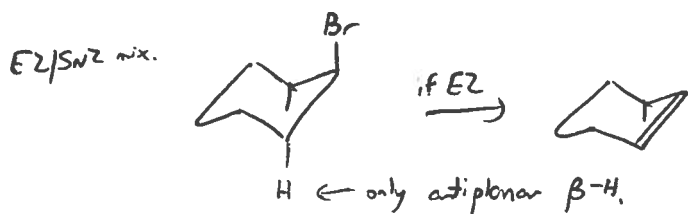
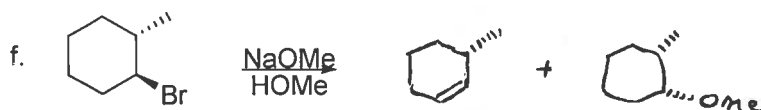
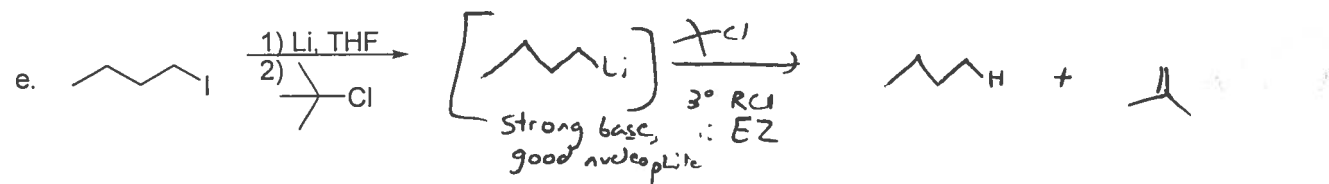
- 1) For each of the reactions shown below, **circle the mechanism(s)** you would expect to see, if any, and **draw the product(s)**. If a mixture of stereoisomers is formed, show all stereoisomers using wedges and dashes to indicate configuration. If an elimination occurs, show only the major alkene product. If none of the mechanisms would take place in a reasonable time frame, write NR for No Reaction. (2 pts each)



2) For each reaction shown below, predict the <sup>organic</sup> product(s). Ignore stereochemistry. (3 pts each)

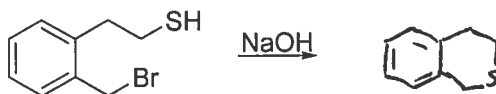


Show monochlorination products only.

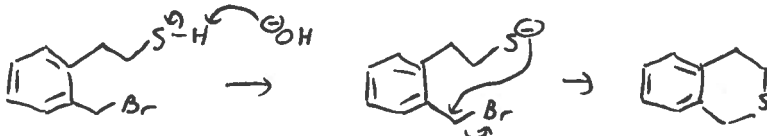


## 3) Mechanism 1:

- a. When the molecule shown below is allowed to react with sodium hydroxide, a product is formed that has the formula  $C_9H_{10}S$ . Predict the structure of the product. (2 pts)

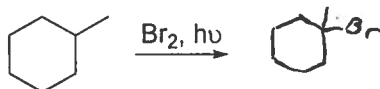


- b. Write an arrow-pushing mechanism for this reaction. (6 pts)

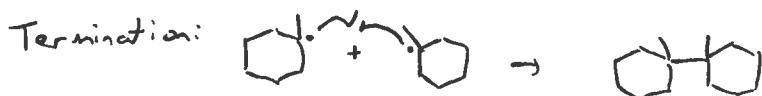
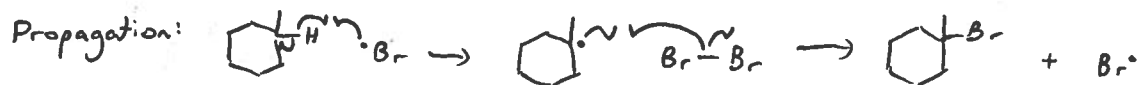
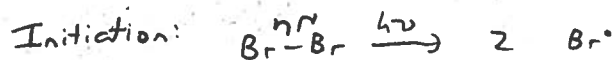


## 4) Mechanism 2:

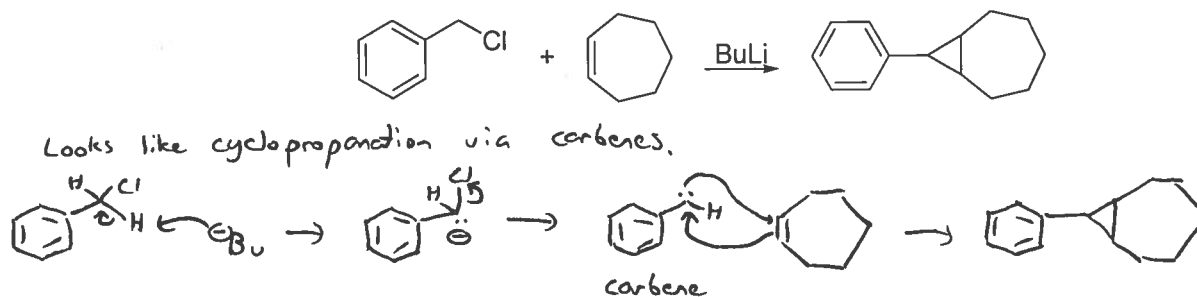
- a. Predict the major product(s) of the reaction shown below, ignoring stereochemistry. (2 pts)



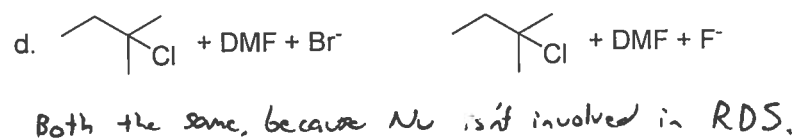
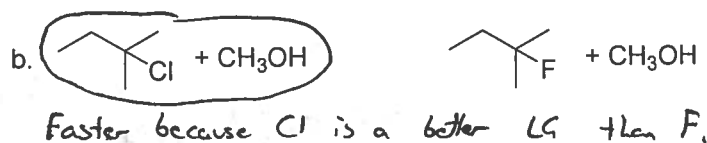
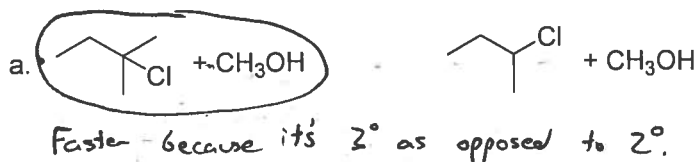
- b. Write an arrow-pushing mechanism for this reaction. Clearly label your initiation, propagation and termination steps, and show at least two examples of termination. (8 pts)



- 5) Write an arrow-pushing mechanism for the reaction shown below. (Hint: what kind of new ring are you forming? What other reactions do that, and how do they work?) (12 pts)



- 6) For each of the following pairs of reactions, circle the one that would be faster at  $S_N1$  and explain why in under ten words. If both are equal, do not circle an option. (4 pts each)



7) Find a way to synthesize the desired product from the given starting material. If more than one step is necessary, show the product of each step. Do not show mechanisms. (20 pts)

