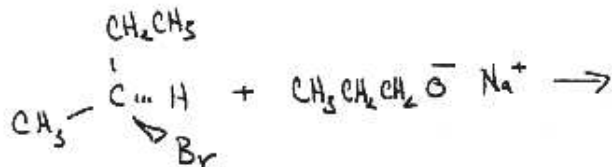


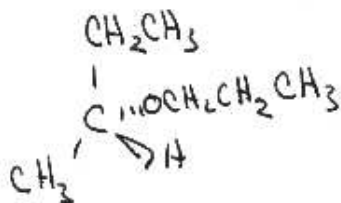
Name: Key (please print)

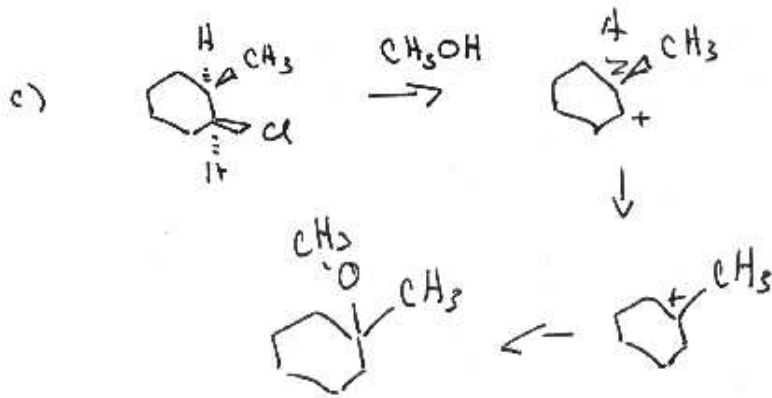
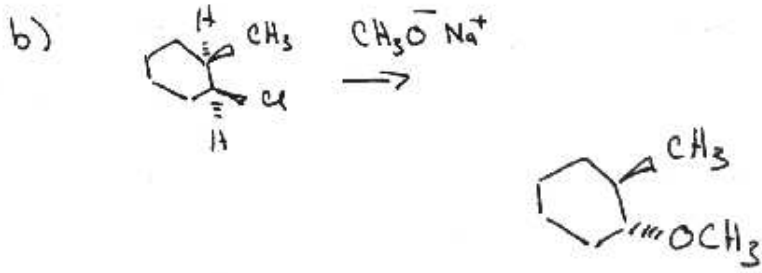
1. (15 pts) Give the configurations of the substitution products formed in the following reactions?

a)

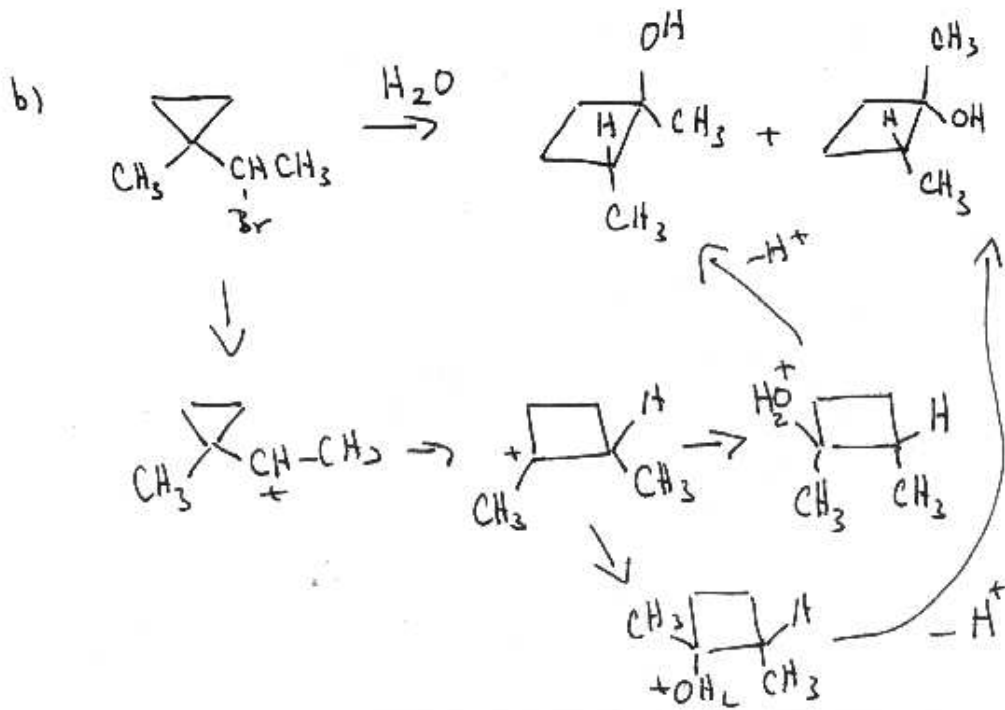
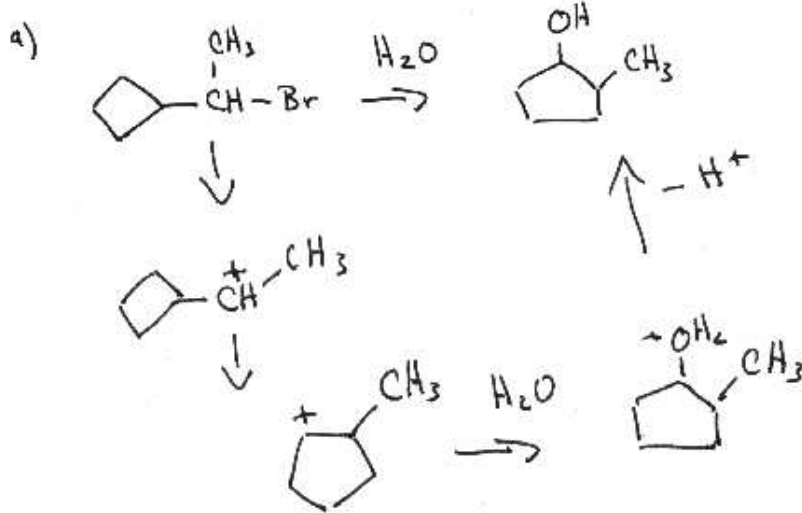


S<sub>N</sub>2



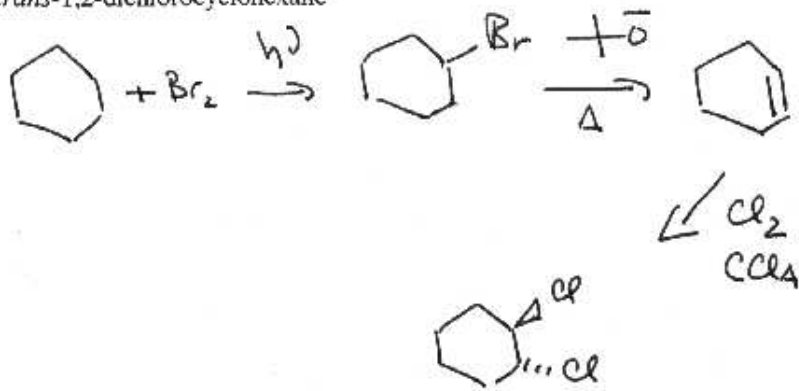


2. (10 pts) Propose a mechanism for each of the following.

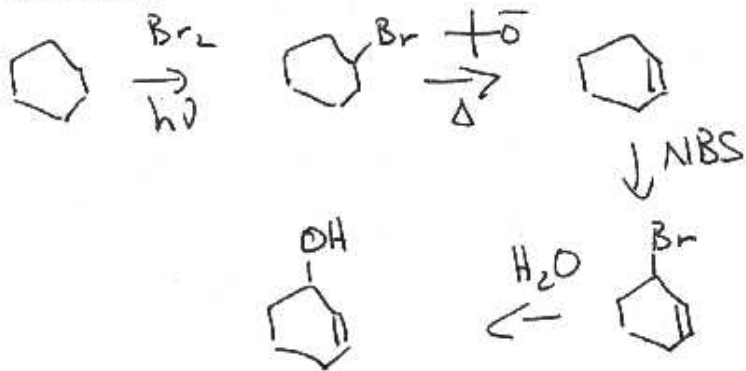


3. (10 pts) Starting with cyclohexane, how could the following compounds be prepared?

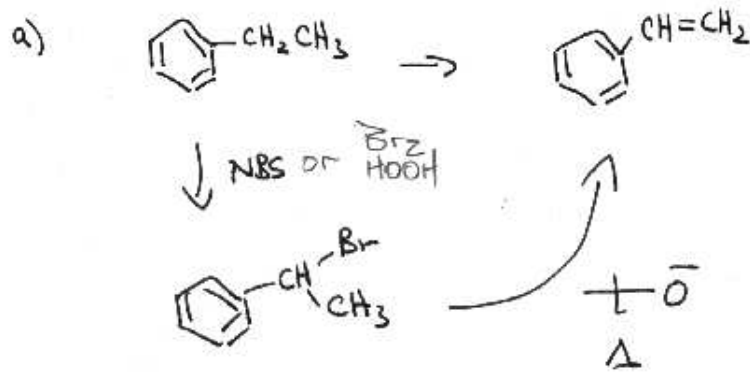
a) *trans*-1,2-dichlorocyclohexane

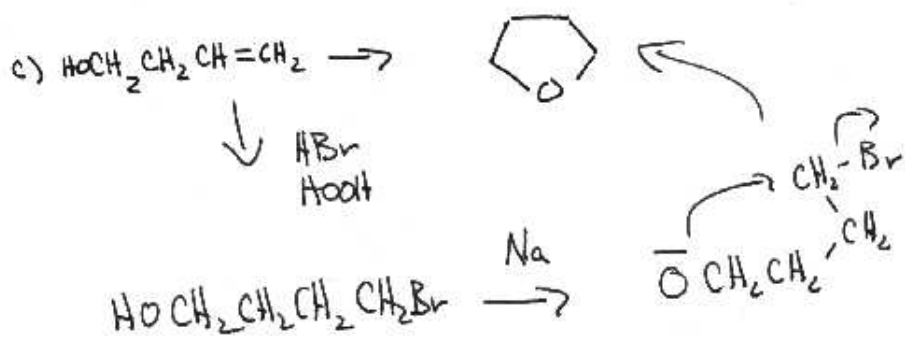
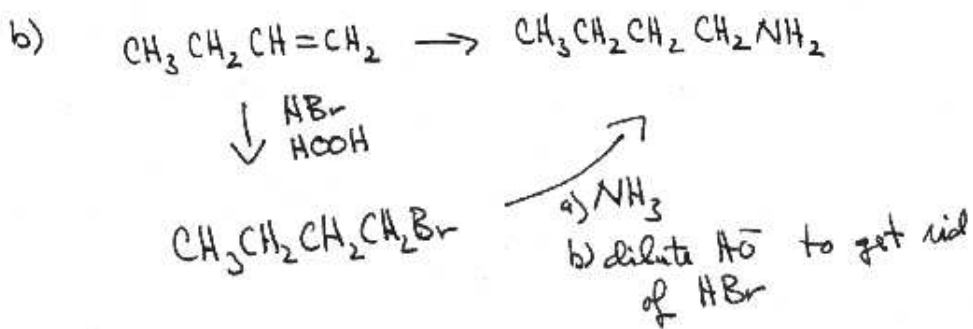


b) 2-cyclohexenol

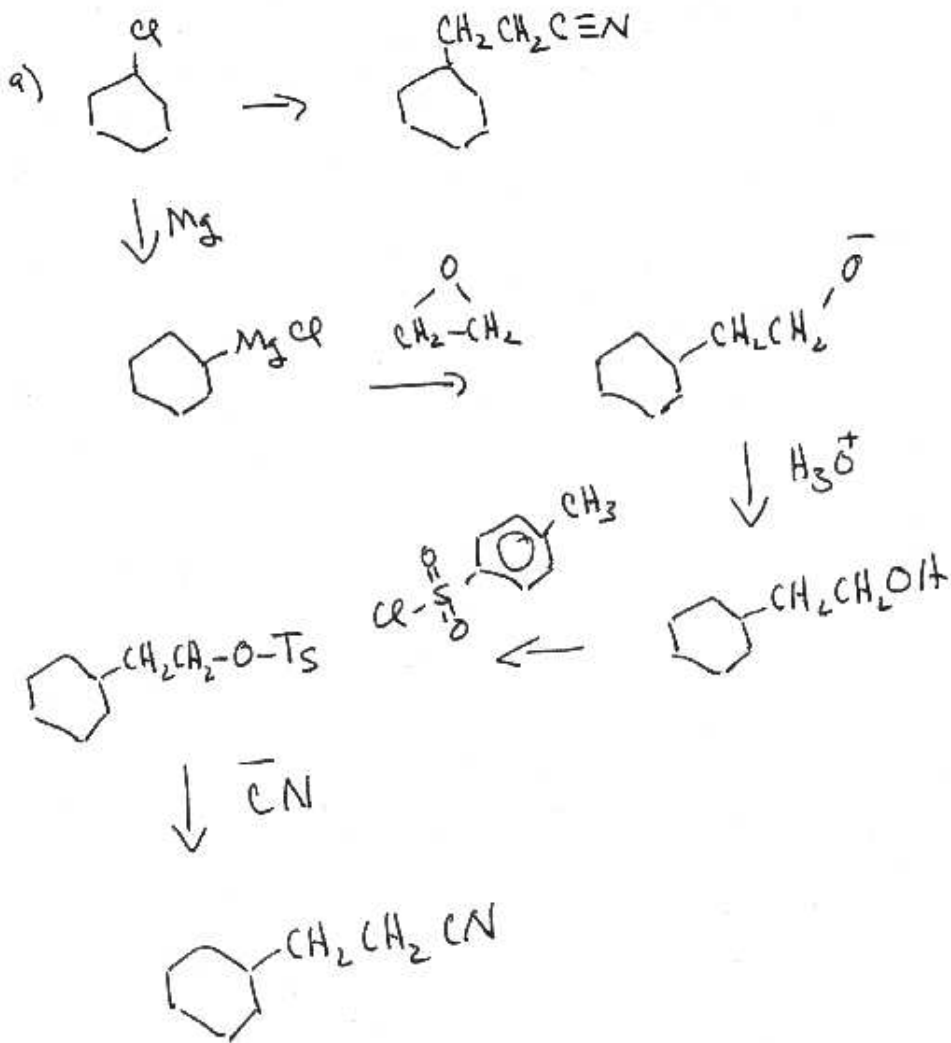


4. (15 pts) Using any materials, indicate how the target compounds could be synthesized.

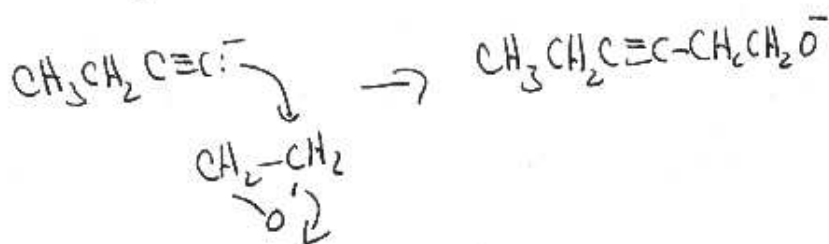
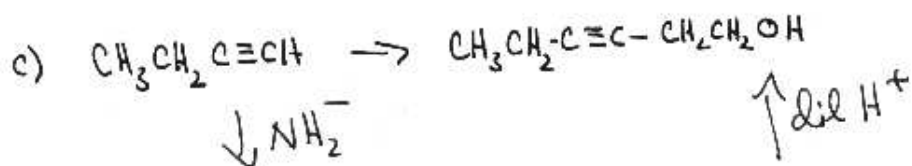
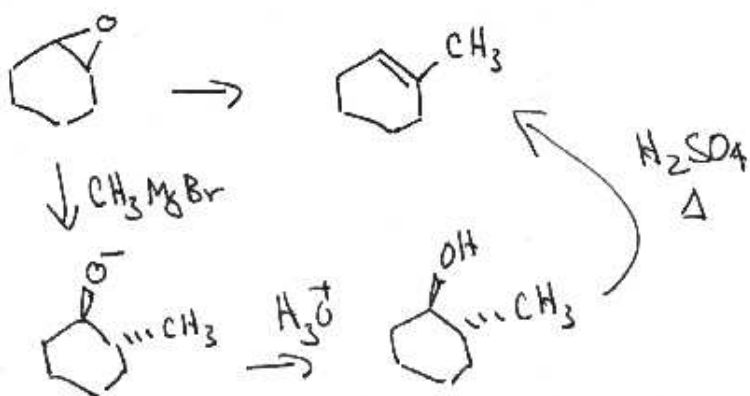




5. (15 pts) Using any inorganic materials and 2 carbon reagents, indicate how the target compounds could be synthesized.

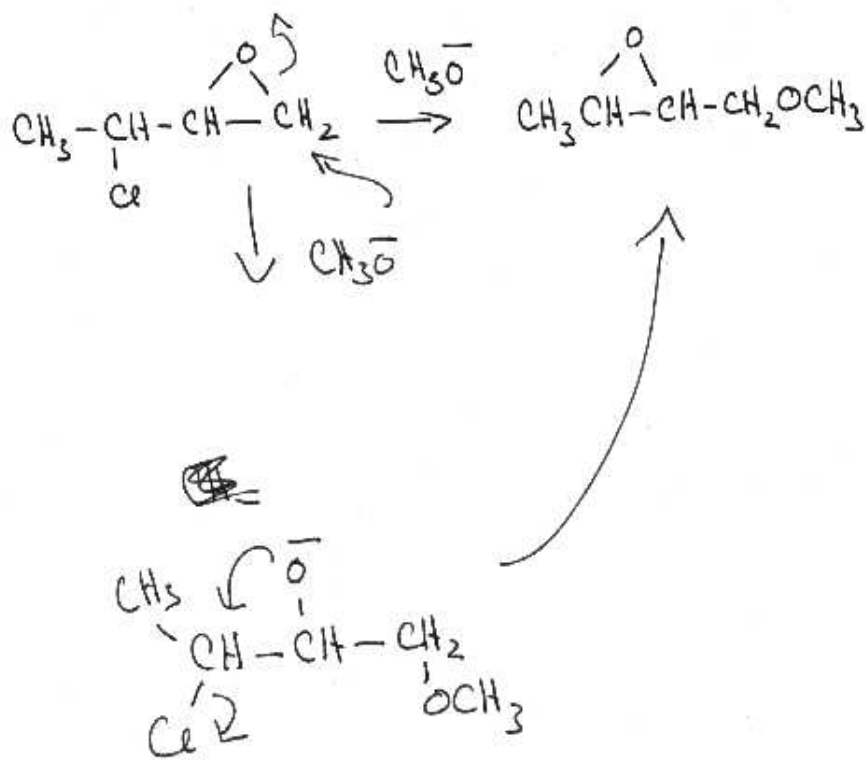


b)



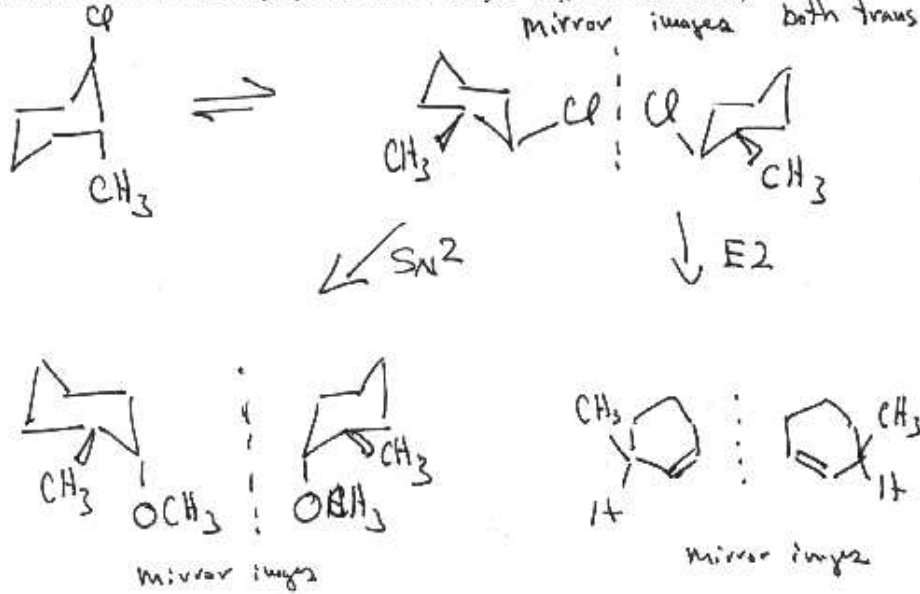


6. (10 pts) Propose a mechanism for the following.

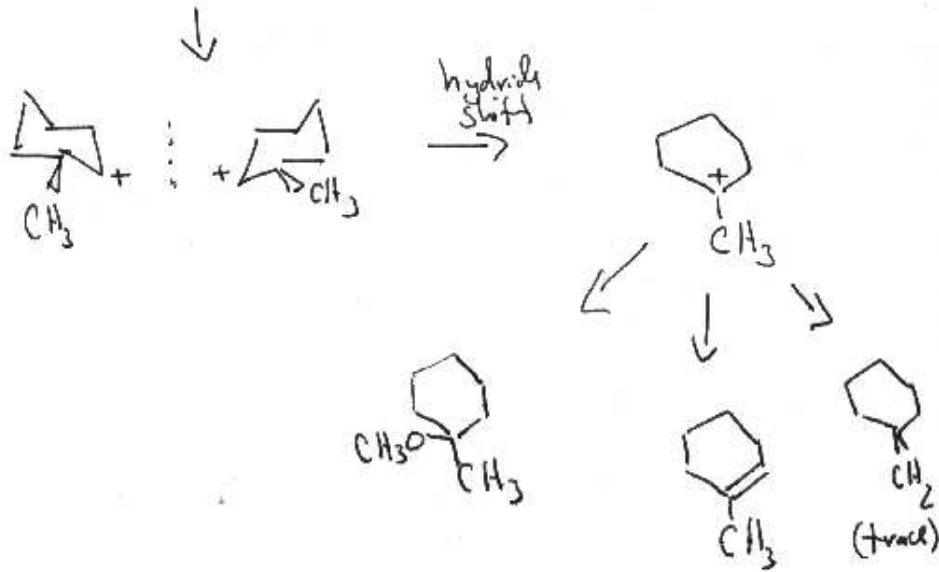


7. (10 pts) Give the substitution/elimination products for each of the following. Be careful to show the configuration of the products.

a) *trans*-1-chloro-2-methylcyclohexane +  $\text{CH}_3\text{O}^-$  ( $\text{S}_{\text{N}}2/\text{E}2$  conditions)  $\rightarrow$  both *trans*



b) *trans*-1-chloro-2-methylcyclohexane +  $\text{CH}_3\text{OH}$  ( $\text{S}_{\text{N}}1/\text{E}1$  conditions)  $\rightarrow$



8. (15 pts) Two products are obtained from the reaction of Z-2-pentene with H<sub>2</sub>O and a trace of H<sub>2</sub>SO<sub>4</sub>. The mass spectra are shown below. Identify the compounds responsible for the spectra. Assign the most intense peak in each spectrum.

