

Printed Name: \_\_\_\_\_

CHEM 3311, Fall 2010  
Professor Walba  
Third Hour Exam  
November 18, 2010

Scores:

1) 20

2) 20

3) 20

4) 20

5) 20

\_\_\_\_\_

100

CU Honor Code Pledge: On my honor, as a University of Colorado at Boulder Student, I have neither given nor received unauthorized assistance.

Name (printed): **KEY** \_\_\_\_\_

Signature: \_\_\_\_\_

Recitation TA Name: \_\_\_\_\_

Recitation day and time: \_\_\_\_\_

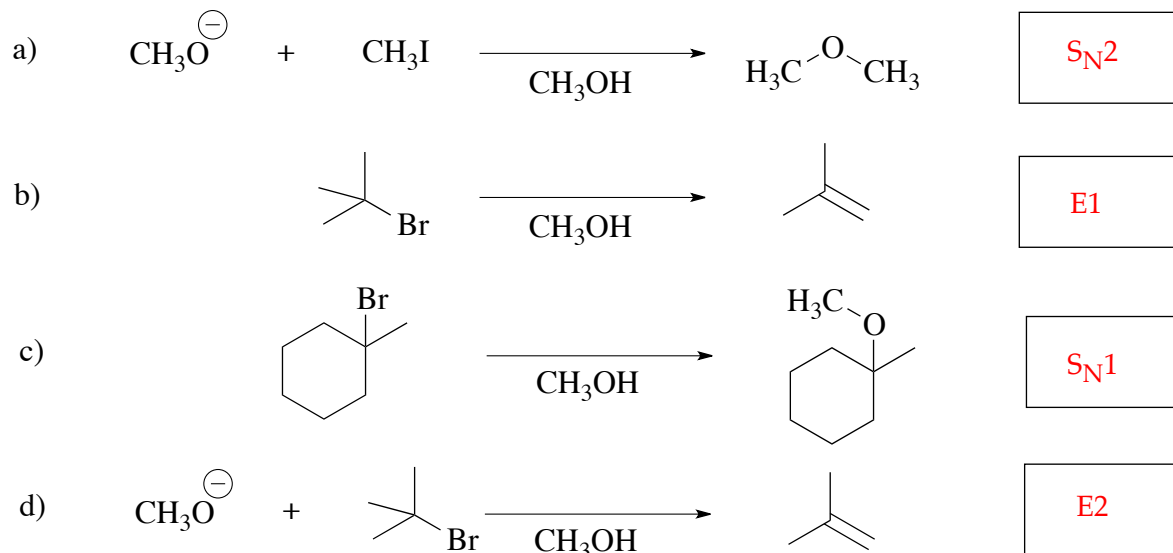
This is a closed-book exam. The use of notes, calculators, scratch paper, or cell phones will not be allowed during the exam. You may use models brought in a clear ziplock bag. Please put all your answers on the test. Use the backs of the pages for scratch.

***PLEASE read the questions very carefully!***

Partial Periodic Table							
1A					8A		
1 H					2 He		
	2A	3A	4A	5A	6A	7A	
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
						35 Br	
						53 I	

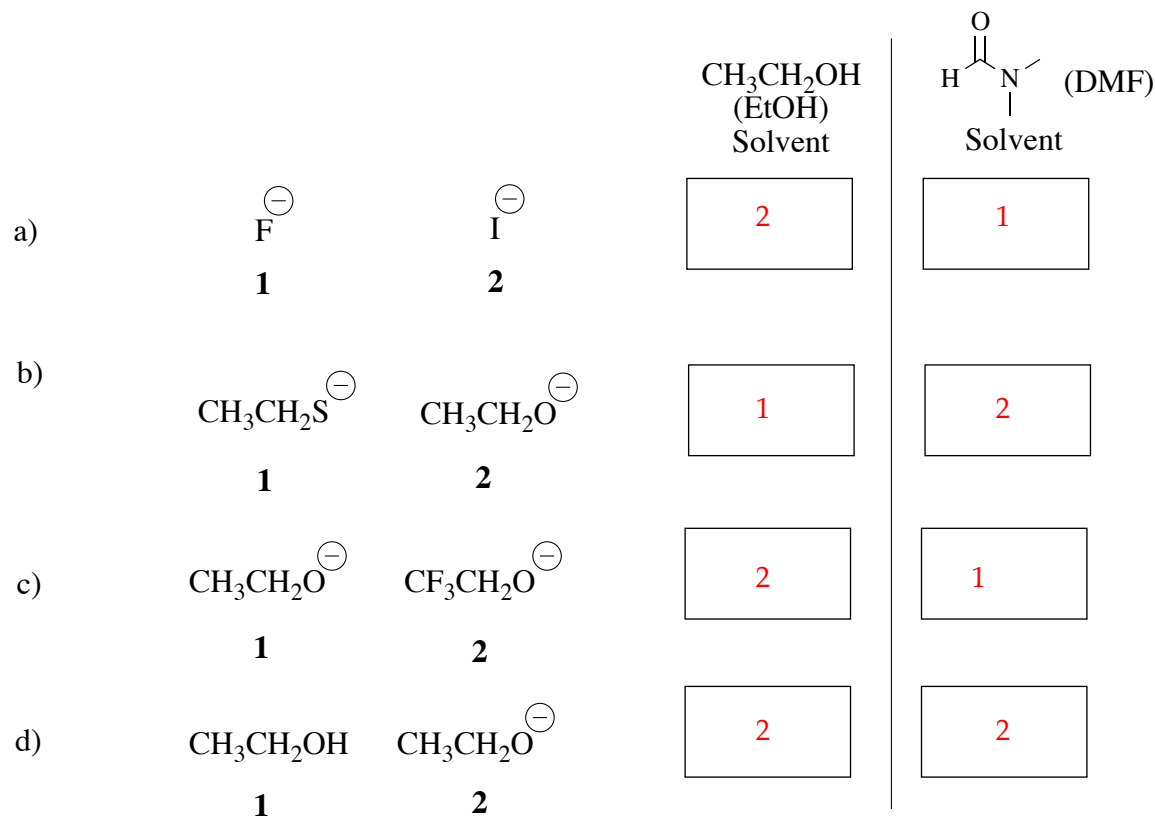
Printed Name: \_\_\_\_\_

1) (20 pts) A. Name the major mechanistic pathway ( $S_N1$ ,  $S_N2$ , E1, or E2) for each of the following reactions. For each reaction the solvent is give under the arrow.



2 each

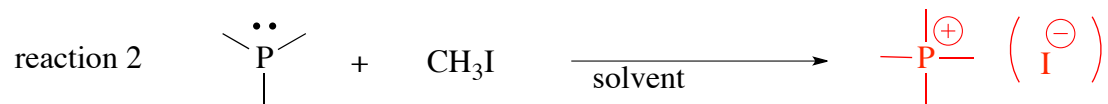
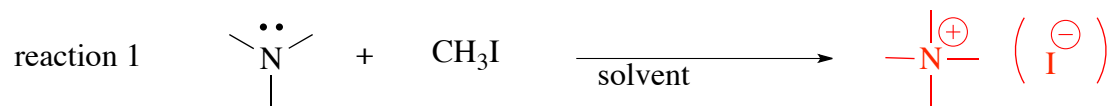
B. For each of the following pairs of nucleophiles, indicate by number the stronger nucleophile in the ethanol solvent (polar, protic), and in DMF solvent (polar, aprotic). Each box should have a 1 or a 2 written inside.



1 each

1) -continued-

C. Give the product of each of the following reactions.



1 each

D. Which of the reactions in part C is faster in methanol solvent?

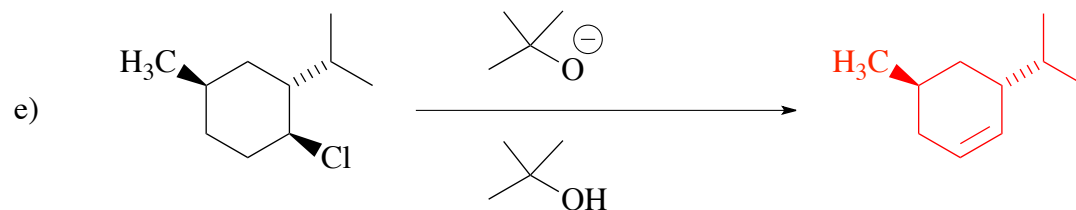
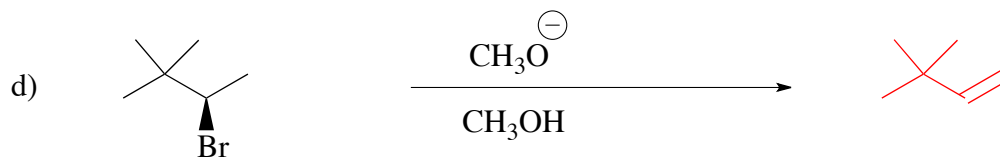
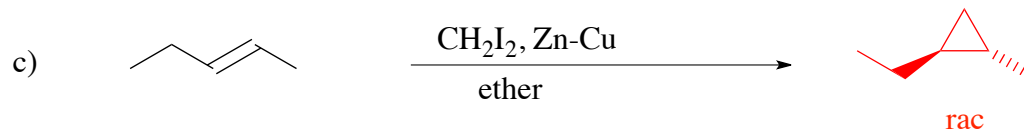
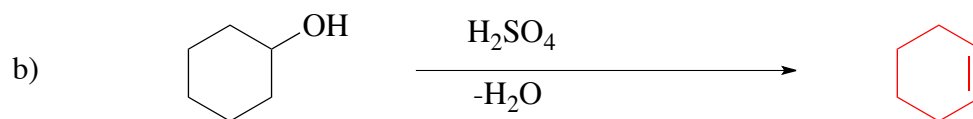
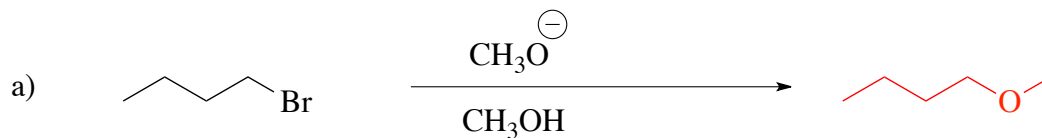
2

E. Which of the reactions in part C is faster in DMF solvent?

1

2) (20 pts) Give the single major organic product of each of the following reactions. If appropriate, carefully show stereochemistry using wedges and dashes. If a racemate is formed, show only one enantiomer of the product, and label it "rac." Assume chiral starting materials are enantiomerically pure unless they are labeled "rac."

4 each

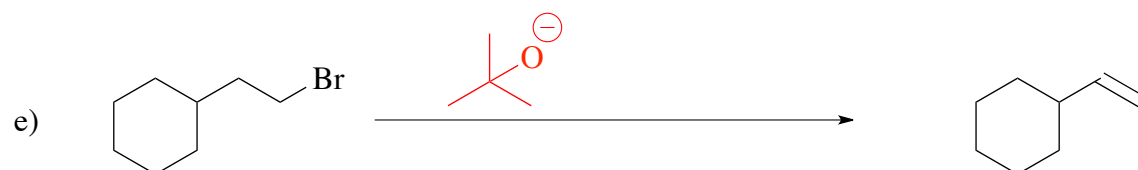
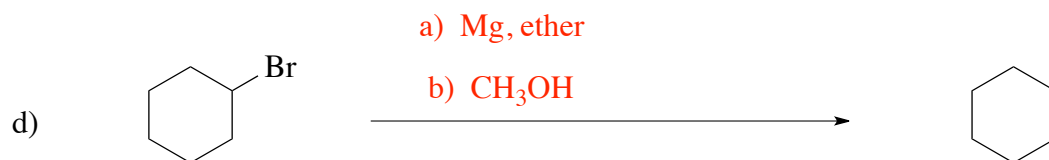
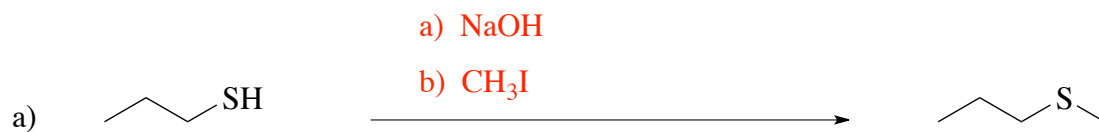


20  
total

Printed Name: \_\_\_\_\_

3 (20 pts) Propose reagents for accomplishing each of the following reactions. Make your reactions efficient (i.e. the target product should be the major product). More than one step reaction sequences may be required. Be careful to indicate the separate steps in the sequence.

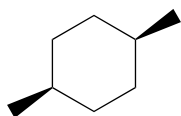
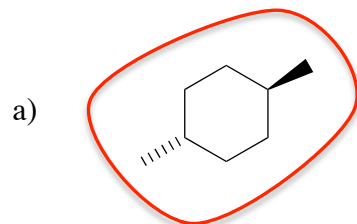
4 each



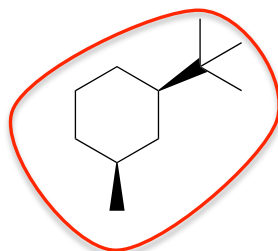
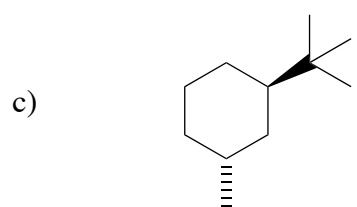
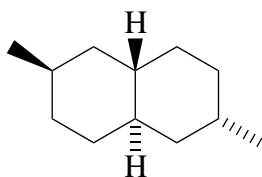
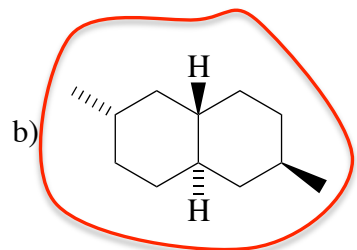
20  
total

Printed Name: \_\_\_\_\_

4) (20 pts) A) For each of the following pairs of isomers, circle the more stable one. If the isomers have the same stability, label them "same."



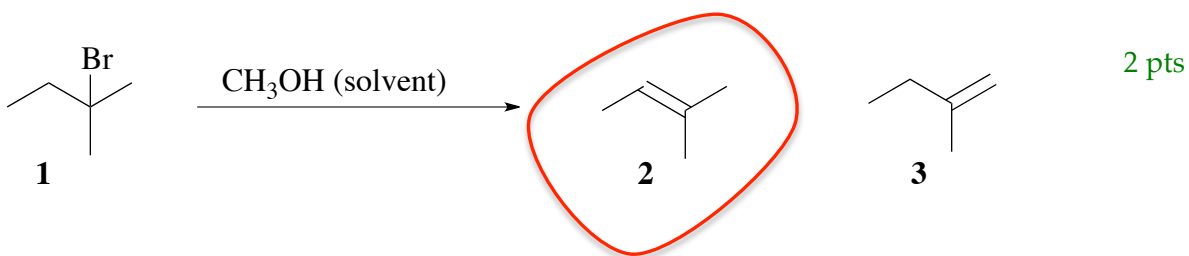
4 each



12  
total

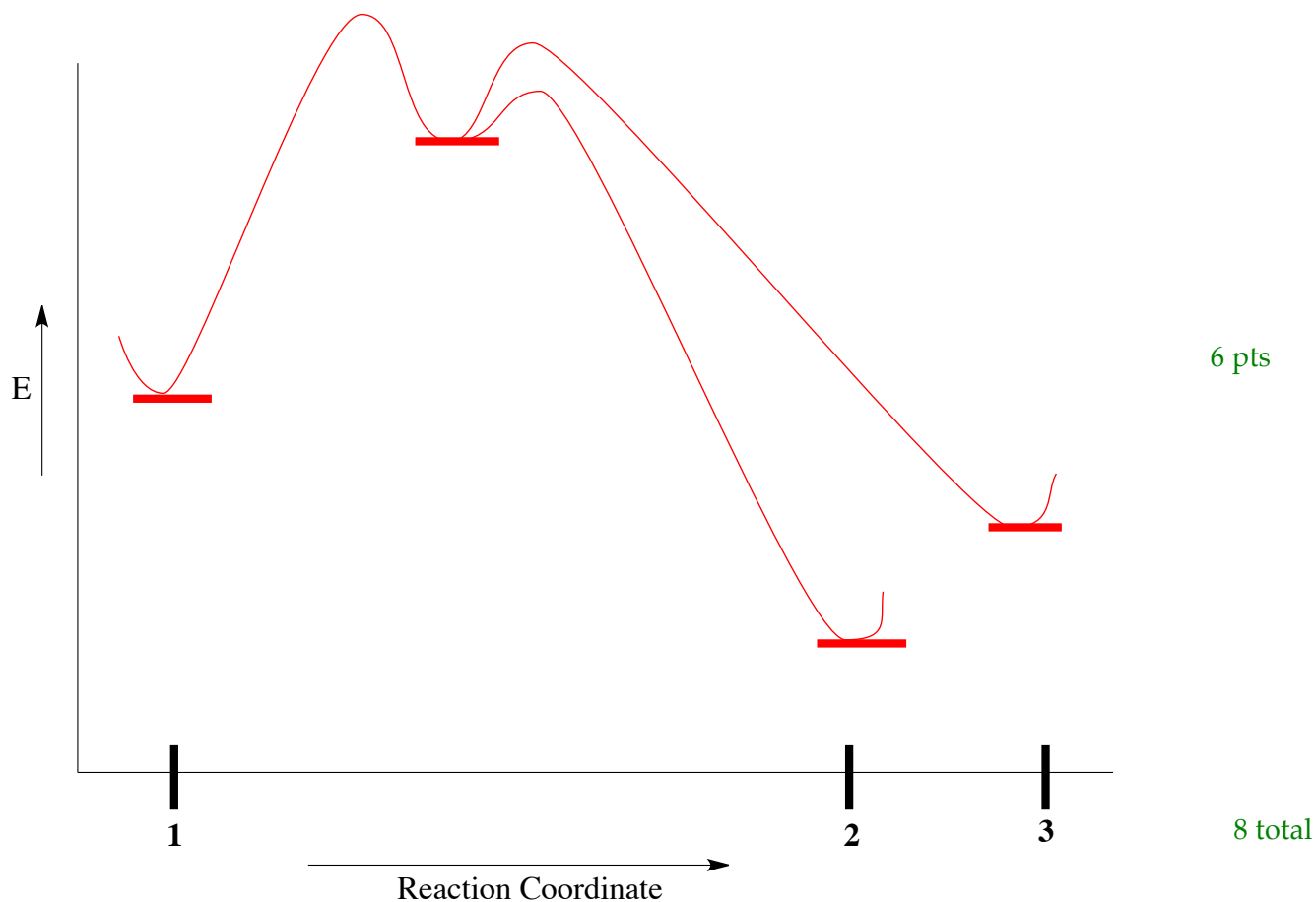
4) -continued-

B) Dissolving 2-bromo-2-methylbutane (**1**) in methanol solvent gives two alkene products, 2-methyl-2-butene (**2**), and 2-methyl-1-butene (**3**) as shown below. For this question ignore other possible products.



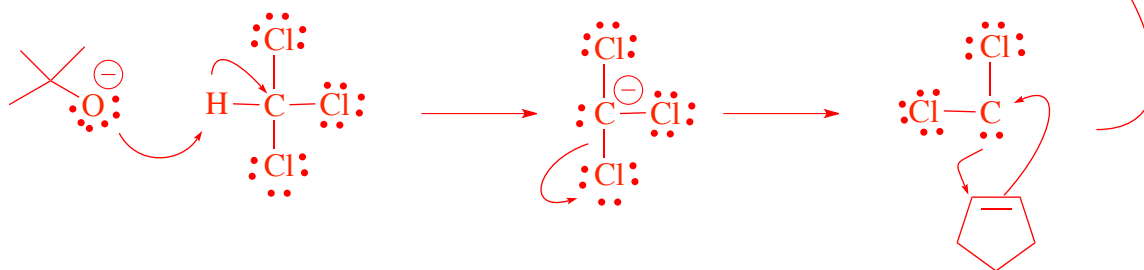
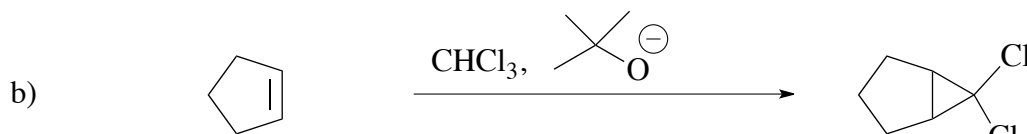
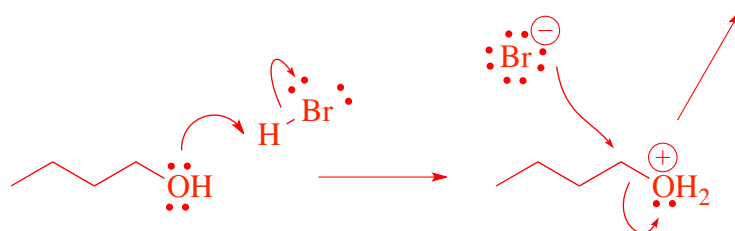
a) Circle the major alkene product of this reaction.

b) Carefully complete the energy diagram below for this reaction. Assume both alkene products **2** and **3** are more stable than the starting bromide **1**, and that the reaction is irreversible. Be careful to indicate the correct relative stability of the two product alkenes **2** and **3**. Ignore what happens to the Br.



5) (20 pts) Propose arrow-pushing mechanisms for each of the following transformations. Show **all** intermediates in your mechanisms, but do not show transition states. Be sure structures are complete, including all lone pairs.

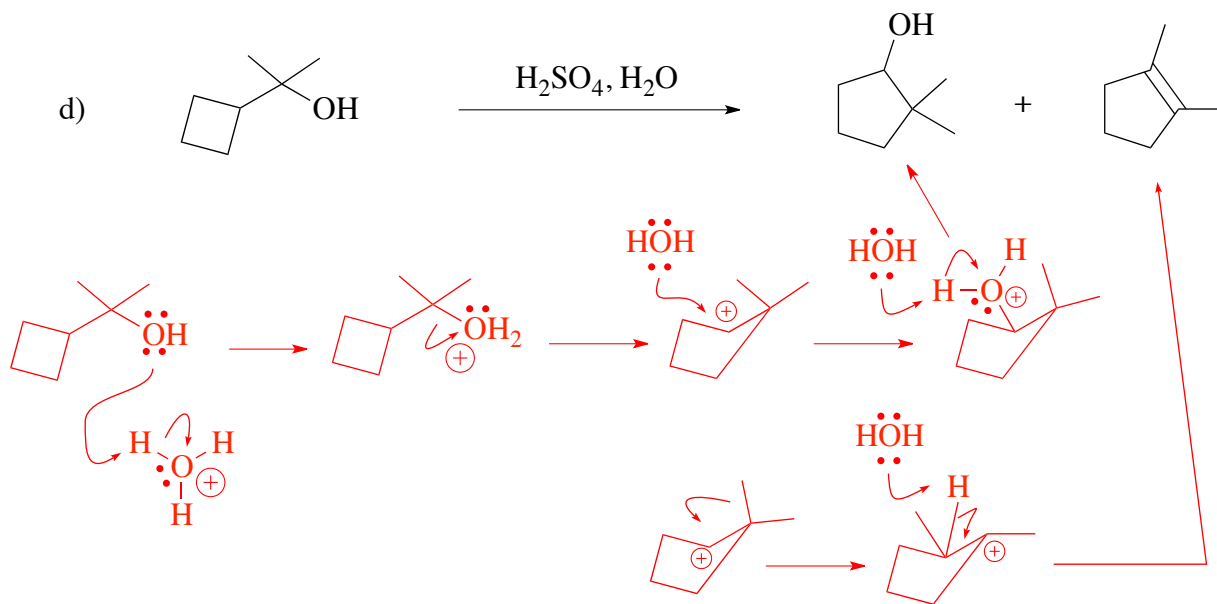
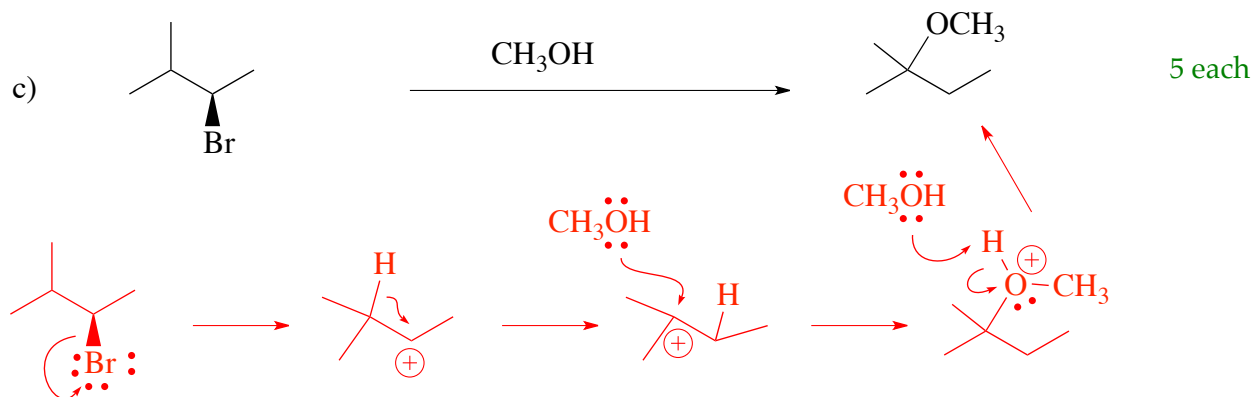
5 each



10  
total



5) - continued



10  
total