

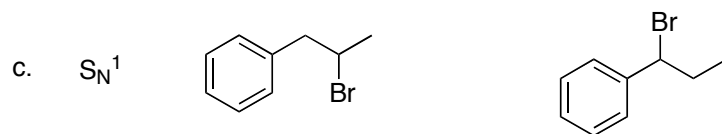
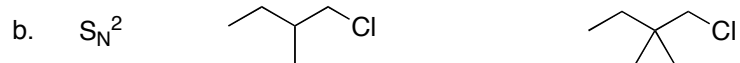
**S341 Exam 3 Practice Exam**  
Spring 2009

100 Points

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

1. **Read All Directions Carefully.**
2. Write your answer in the space provided, put all of your work on the exam.
3. Only 1 answer can be provided for each question, if you provide multiple answers, no points will be awarded.
4. Baseball hats are not allowed, if you must wear one, turn the bill around.
5. No calculators or written materials of any kind are allowed.
6. Molecular models are permitted, but written instructions for them are not.
7. If you have a question, ask it. Ambiguities will not be recognized after the exam.
8. All chemical structures must be drawn clearly – if they cannot be deciphered, points will not be assigned.

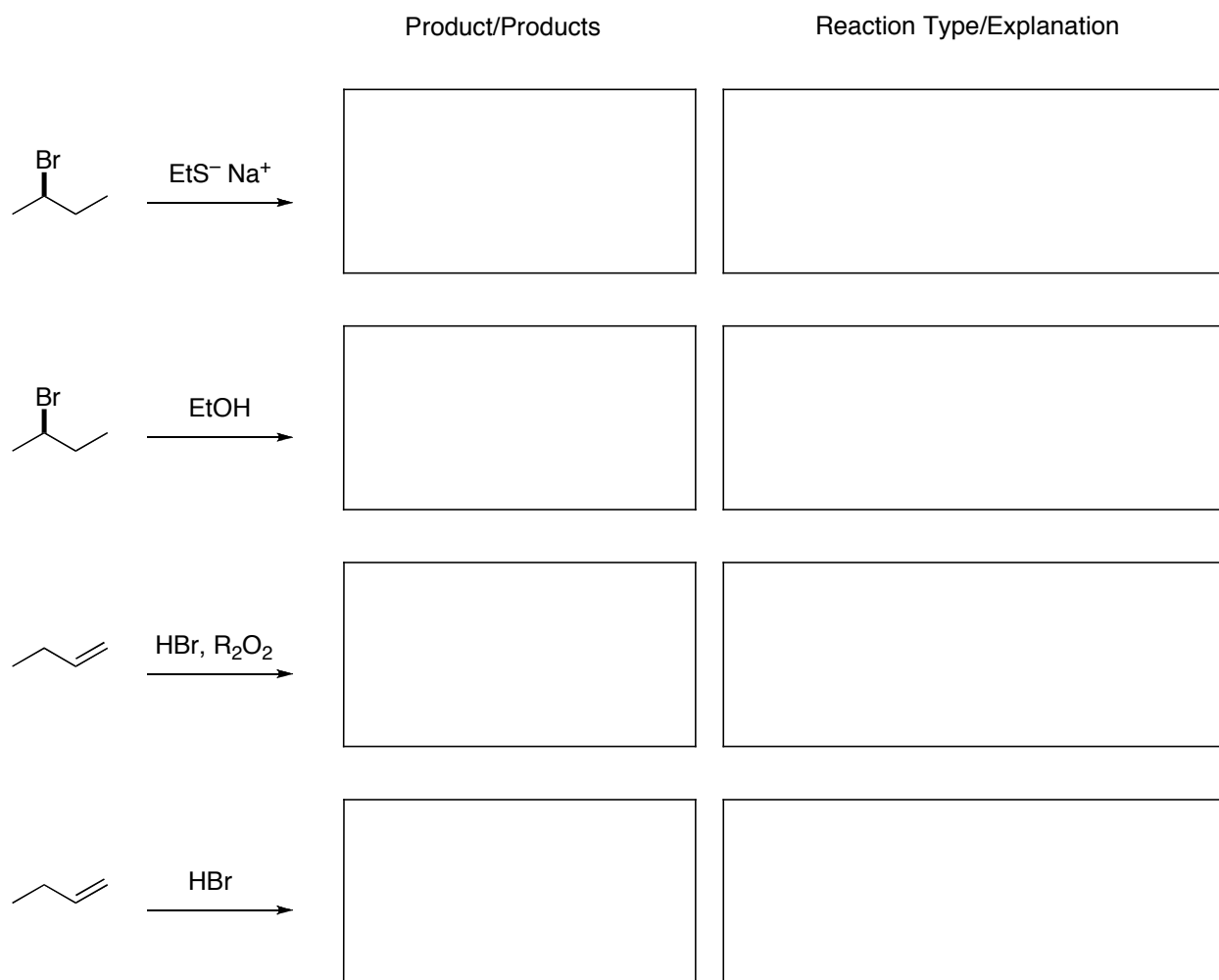
1. (XX pts) For each set, circle the compound that will have the fastest rate for the reaction indicated. Briefly explain your choice.



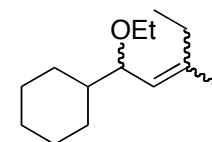
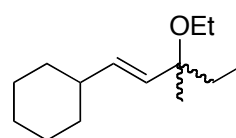
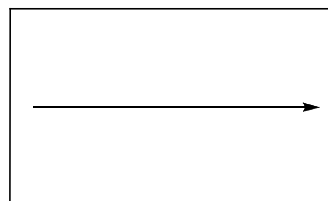
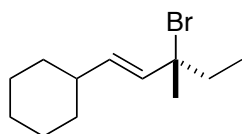
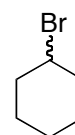
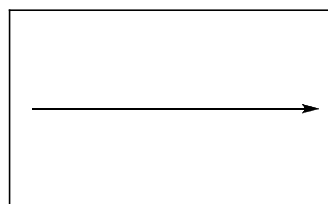
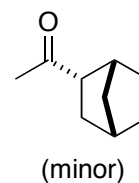
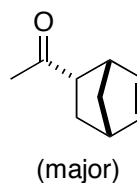
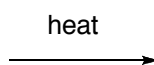
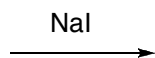
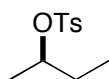
2. (XX pts) Explain why this alkyl halide will not undergo a substitution reaction.



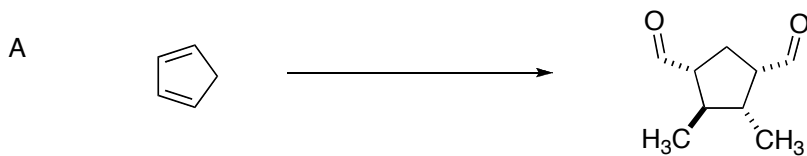
3. (XX pts) For each of the following reactions, provide the major product or products and indicate the reaction type ( $S_N^1$ ,  $S_N^2$ , radical alkene addition, electrophilic alkene addition, etc). Briefly explain your choice. Pay attention to stereochemistry and regiochemistry.



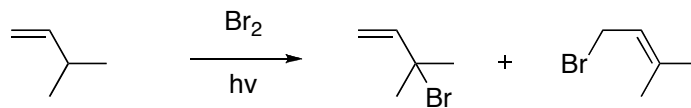
4. (XX pts) Provide the products or reagents to complete the following reactions. Some may require multiple steps. Pay attention to stereochemistry and place your final answer in the boxes provided.



5. (XX pts) Provide the reagents needed to perform the following multi-step syntheses. Show all steps and intermediate products, make sure to justify stereochemistry.



6. (XX pts) Draw a detailed mechanism for the following reaction that clearly illustrates the formation of the isomers shown. Label all steps in the reaction (i.e. initiation, propagation, termination) and show two distinct termination steps/



# S341 EXAM 3

Spring 2009

## GRADE SHEET

Question	Possible Points	Actual Points
1	XX	_____
2	XX	_____
3	XX	_____
4	XX	_____
5	XX	_____
6	XX	_____
<hr/>		
<b>Total</b>	<b>100</b>	_____

### Hints for Answers:

- 1a. Rxn in DMF is faster because polar solvent stabilizes transition state
- 1b. First cmpd is faster due to lesser  $\beta$ -branching
- 1c. 2<sup>nd</sup> cmpd is faster due to benzylic stabilization of the carbocation.
2. SN2 is blocked by sterics, SN1 is prohibited by ring strain.
- 3a. SN2 – rxn proceeds with inversion
- 3b. SN1 rxn gives racemic product
- 3c. radical hydrobromination, Br goes to less substituted carbon
- 3d. electrophilic hydrobromination, Br goes to more substituted carbon
- 4a. (S)-2-iodobutane
- 4b. cyclopentadiene and methyl, vinyl ketone (Diels Alder)
- 4c. HBr and a dialkyl peroxide with heat.
- 4d. Ethanol (Sn1)
- 5a. step 1, trans-2-butene Diels Alder; step 2, O<sub>3</sub> with PPh<sub>3</sub> (oxidative cleavage of double bond)
- 5b. step 1, NBS and a dialkyl peroxide to generate the allylic radical; step 2, OsO<sub>4</sub> to dihydroxylate on the face away from the bromide.
6. See Page 485 of Bruice for the detailed mechanism.