

Student ID \_\_\_\_\_

Name KEY

Recitation Date/Time \_\_\_\_\_ TA Name \_\_\_\_\_

page points:

2 \_\_\_\_\_ (24)

3 \_\_\_\_\_ (26)

4 \_\_\_\_\_ (24)

5 \_\_\_\_\_ (16)

6 \_\_\_\_\_ (10)

Total \_\_\_\_\_ (100)

## Periodic Table

H																	He
Li	Be											B	C	N	O	F	Ne
Na	Mg											Al	Si	P	S	Cl	Ar
K	Ca	Sc	Ti	V	Cr	Mn	Fe	Co	Ni	Cu	Zn	Ga	Ge	As	Se	Br	Kr
Rb	Sr	Y	Zr	Nb	Mo	Tc	Ru	Rh	Pd	Ag	Cd	In	Sn	Sb	Te	I	Xe
Cs	Ba	La	Ha	Ta	W	Re	Os	Ir	Pt	Au	Hg	Tl	Pb	Bi	Po	At	Rn
Fr	Ra	Ac															

**Please sit with an empty seat between you and your neighbors.**

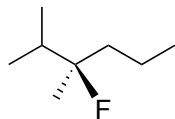
**Please silence your cell phones and keep them in your bags during exam.**

**You may use molecular models. Please bring them in transparent bags.**

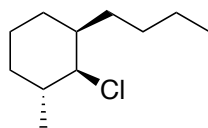
**Feel free to ask questions about the questions, but please don't ask questions about your answers, it distracts your neighbors.**

1. Provide the structure for each of the following compounds (4 pts each)

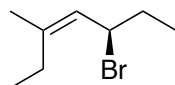
a) (R)-3-fluoro-2,3-dimethylhexane



b) (1R,2S,3R)-1-butyl-2-chloro-3-methylcyclohexane

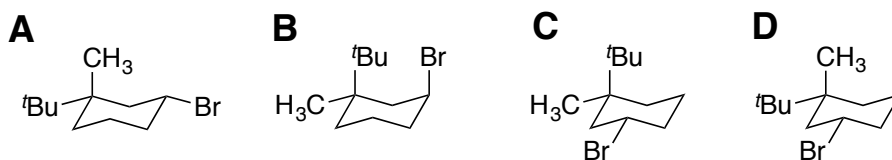


c) (Z,R)-5-bromo-3-methyl-3-heptene



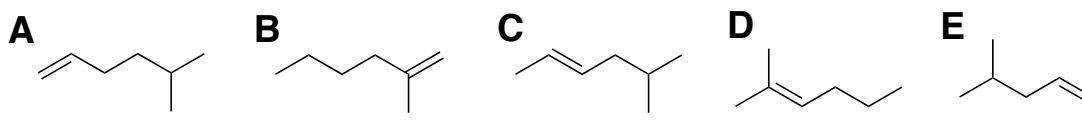
2. Identify the most and least stable species in each of following series (3 pts each)

a)



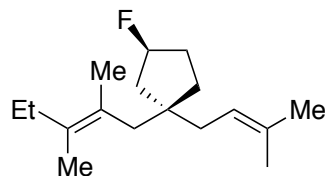
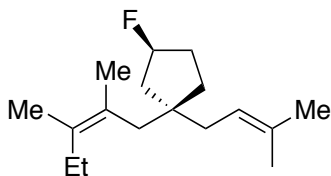
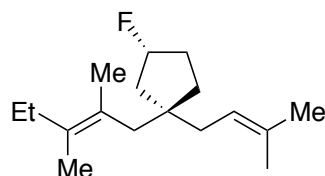
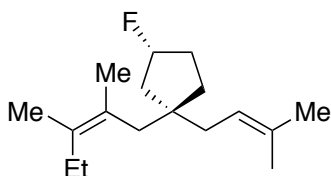
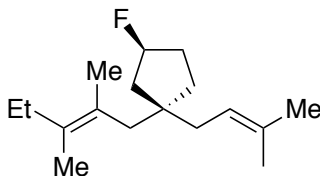
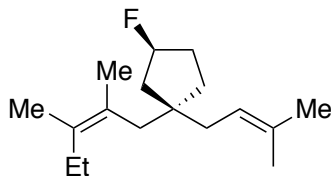
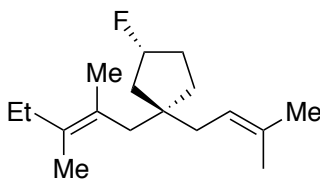
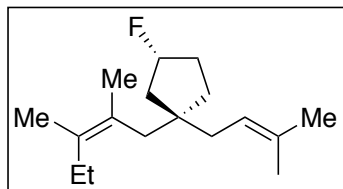
Most stable: A,D; Least stable: B.

b)

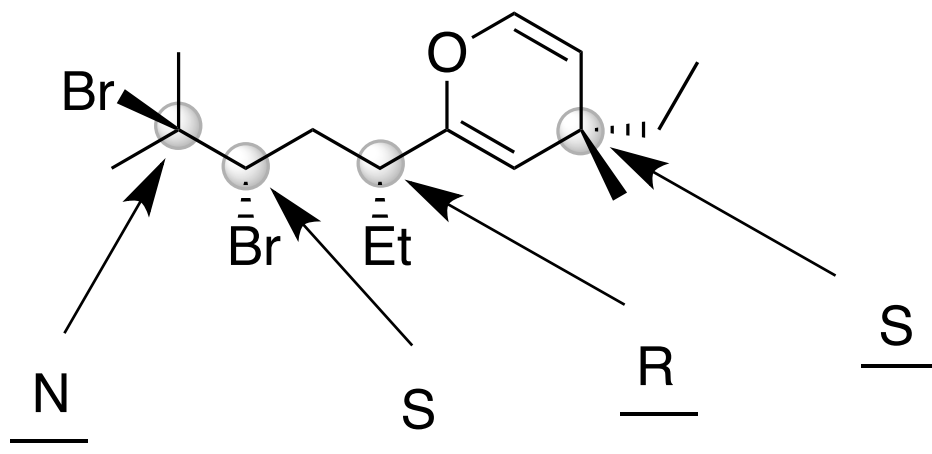


Most stable: D; Least stable: A.

3. Draw all 7 stereoisomers of the following molecule (2 pts each);

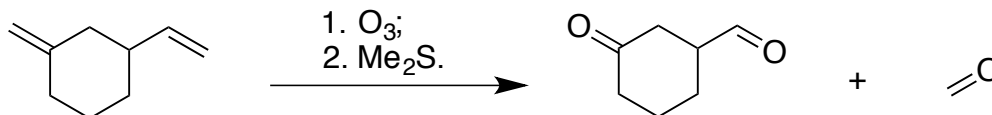


4. Assign the stereochemistry of each highlighted carbon using **R**, **S**, or **Neither** (3 pts each).

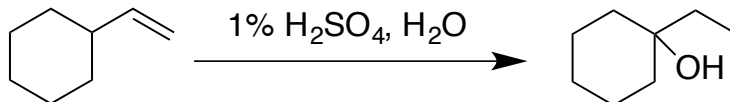


5. Provide the major product(s) for each of the following reactions (stereochemistry **not** required, 4 pts each)

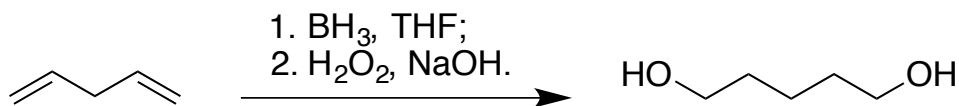
a)



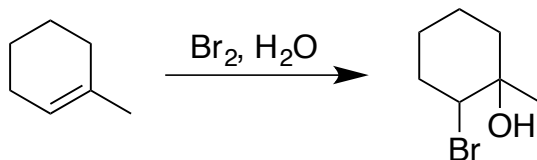
b)



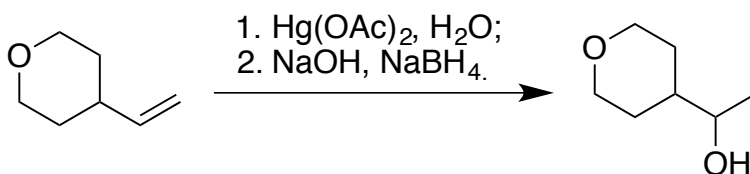
c)



d)



e)



6. Select the best reaction condition for each of the following transformations (4 pts each)

**A:** HBr

**C:**  $\text{BH}_3$ ; then  $\text{NaBH}_4$

**E:**  $\text{Hg}(\text{OAc})_2$ ,  $\text{H}_2\text{O}$ ; then NaOH,  $\text{NaBH}_4$

**G:**  $\text{Br}_2$ ,  $\text{H}_2\text{O}$

**I:**  $\text{Br}_2$

**B:** HBr,  $\text{H}_2\text{O}$

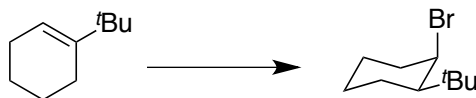
**D:**  $\text{O}_3$ ; then  $\text{H}_2\text{O}_2$

**F:**  $\text{BH}_3$ ; then  $\text{H}_2\text{O}_2$ , NaOH

**H:**  $\text{Br}_2$ , MeOH

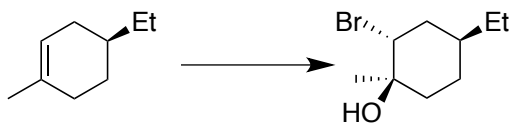
**J:** HBr, peroxide, heat

a)

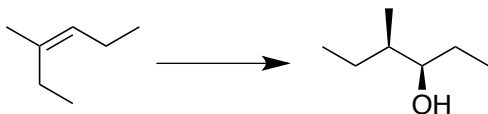


Best condition:     **J**

b)

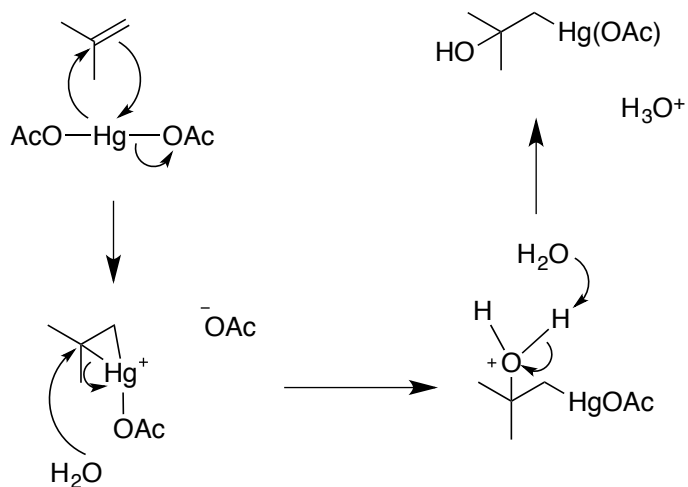
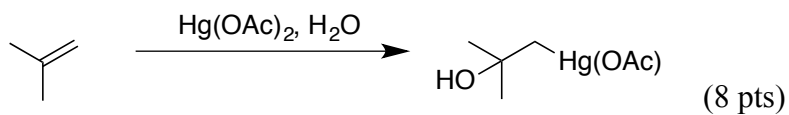
Best condition:     **G**    

c)

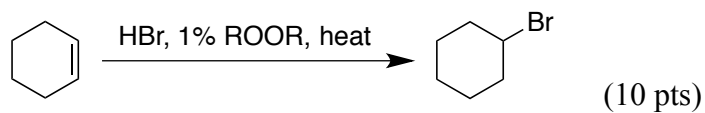
Best condition:     **F**    

7. Use curved arrow or fishhook notation to draw the mechanism for each of the following reactions.

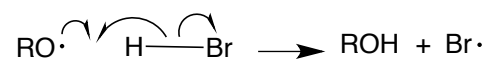
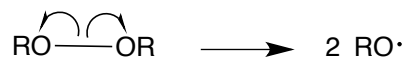
a)



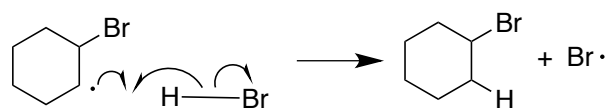
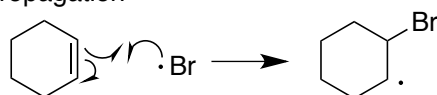
b)



## 1. Initiation



## 2. Propagation



## 3. Termination

