

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

Name Key

TA Name \_\_\_\_\_

&gt;80 A

page \_\_\_\_\_ points:

70 - 79 B

2 \_\_\_\_\_ (14)

50 - 69 C

3 \_\_\_\_\_ (20)

40 - 49 D

4 \_\_\_\_\_ (20)

&lt;40 F

5 \_\_\_\_\_ (12)

6 \_\_\_\_\_ (20)

7 \_\_\_\_\_ (14)

Median 69

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															

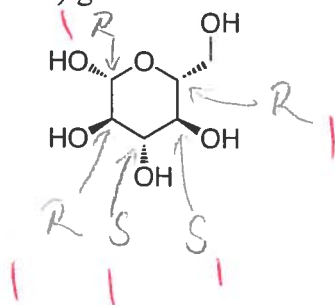
Please sit with an empty seat between you and your neighbors.

Unless specifically asked, you do not have to draw mechanisms for reactions.

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

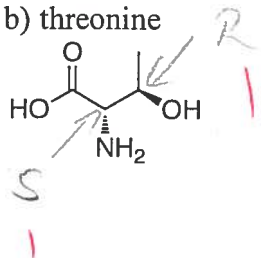
1. Give the configuration (R or S) of each asymmetric center in the following molecule. (14 pts).

a) glucose



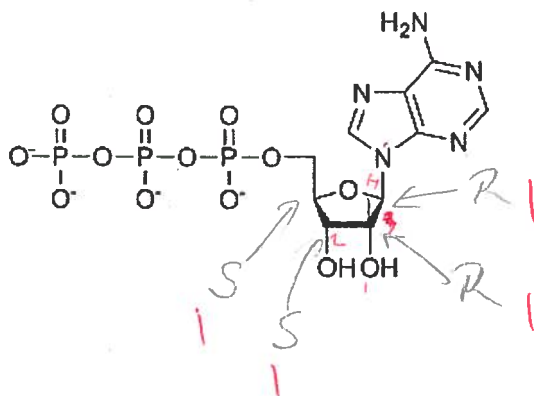
5

b) threonine



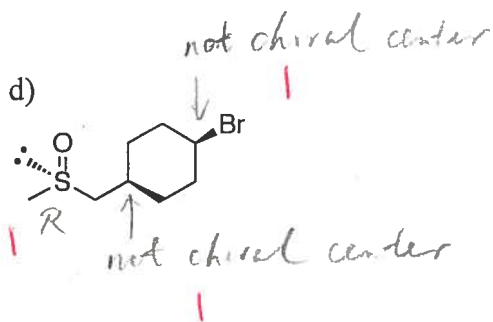
2

c) ATP



4

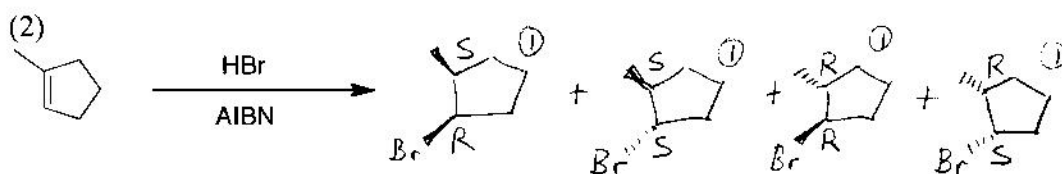
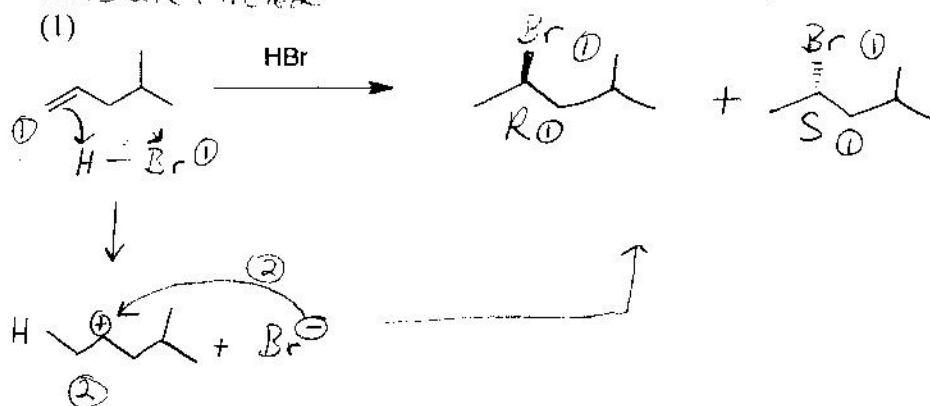
lose pts for extra stereo centers on phosphorus (-1) or nitrogen



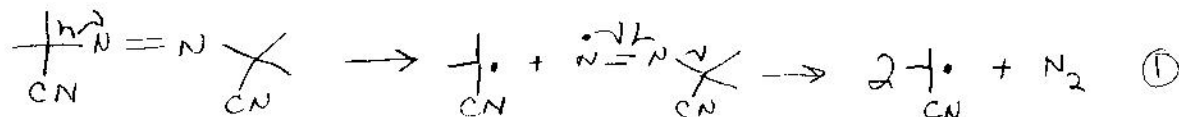
3

1 pt each

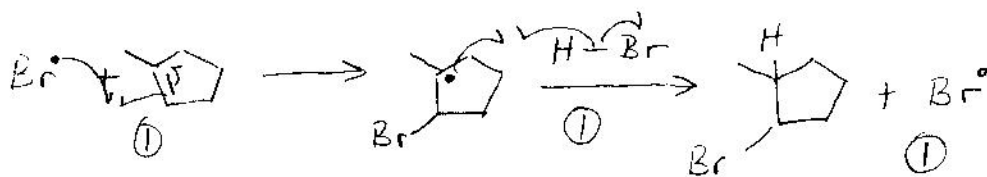
2. Provide all product(s) and the corresponding mechanism of the following reactions. If there are enantiomers or diastereomers, draw all of them and assign R or S for each chiral center (10 pts each) *4pts. for Products, 6pts. for mechanism*  
*Points are circled*



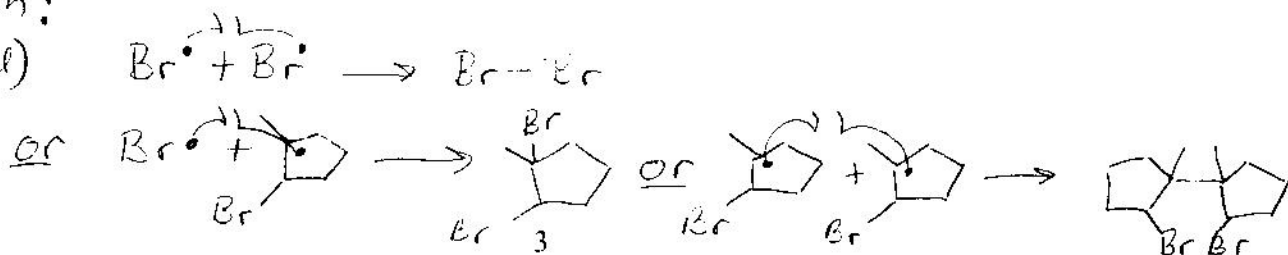
Initiation:  
(2 points total)

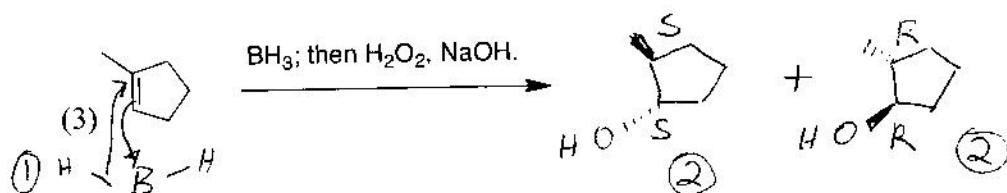


Propagation:  
(3 points total)



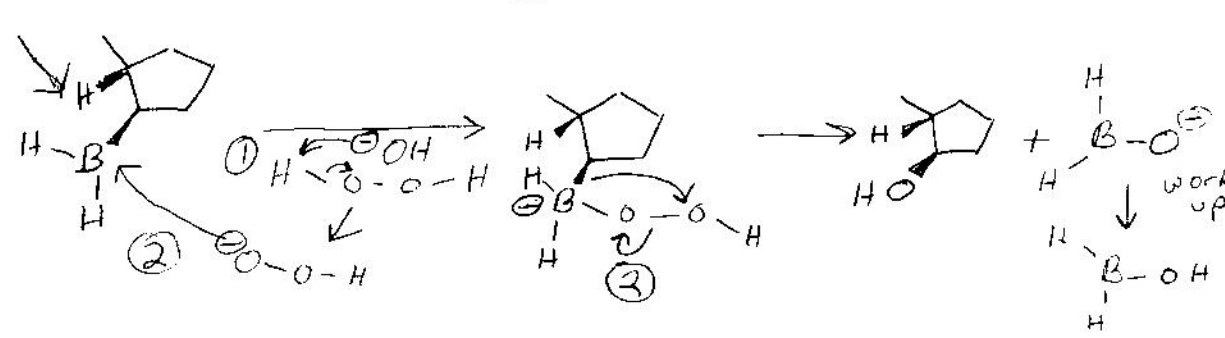
Termination:  
(1 point total)



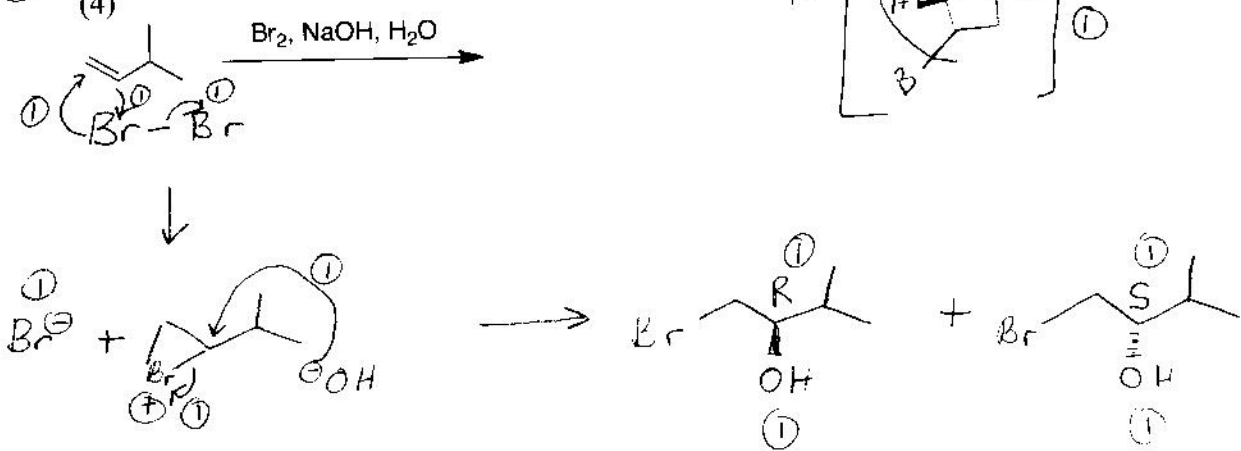
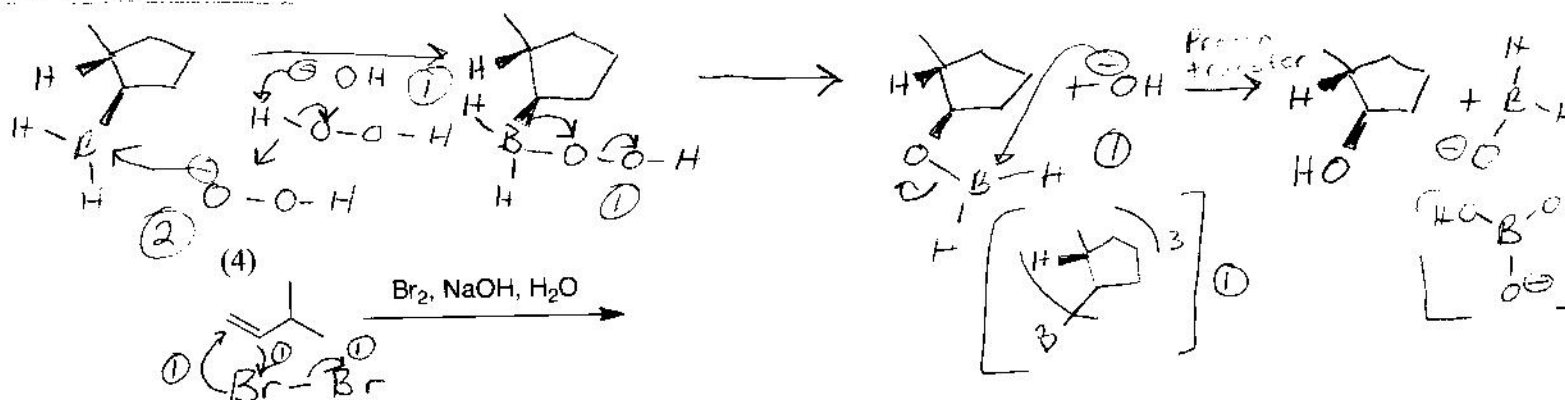


Mechanism 1:

or

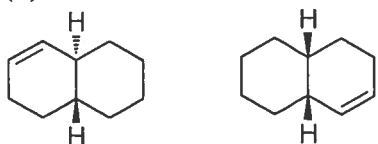


Mechanism 2:



3. Describe the relationship between each of the following pairs of structures (3 pts each).

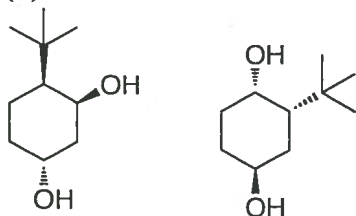
(1)



diastereomer

stereoisomer +1

(2)

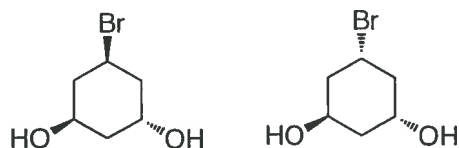


constitutional isomer

constitutional +2

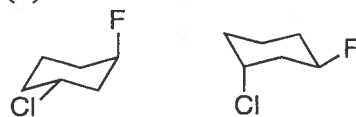
structural +2

(3)



same

(4)



conformer +3

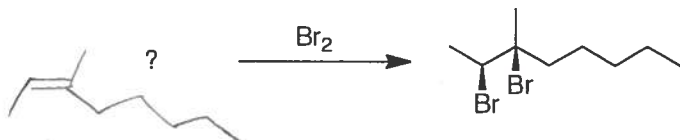
same or conformer isomer +3

Extra incorrect info (2/3)

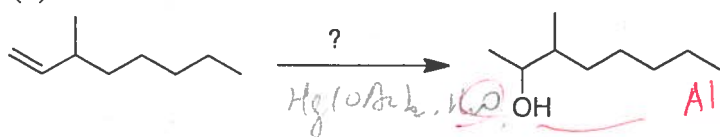
mention conformational +1

4. Provide the missing starting materials or the reagents for the following reactions. (4 pts)

(1)



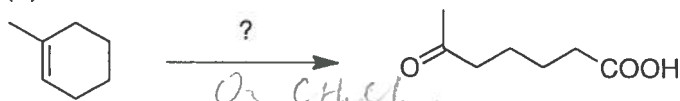
(2)



Handwritten in red:  $\text{Hg(OAc)}_2, \text{H}_2\text{O}$   
then  $\text{NaBH}_4$   
 $\text{H}_3\text{O}^+/\text{H}_2\text{O}$  + 0

Also accepted  $\text{NaOH}$   
Missing  $\text{H}_2\text{O}$  + 3

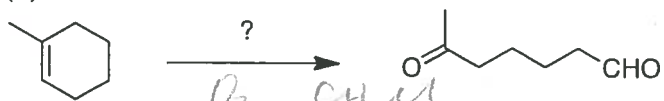
(3)



Handwritten in red:  $\text{O}_3, \text{CH}_2\text{Cl}_2$   
then workup  
-OH (-1)

2 pts each step  
Add DMS then  $\text{H}_2\text{O}_2$  (+2/4)

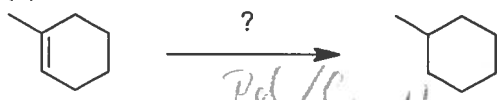
(4)



Handwritten in red:  $\text{O}_3, \text{CH}_2\text{Cl}_2$   
Mend workup

2 pts each step

(5)

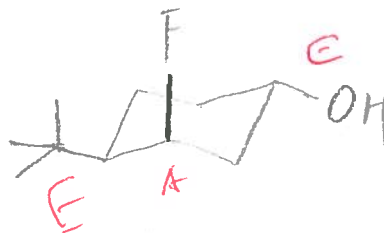
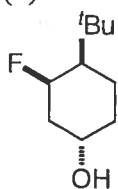


Handwritten in red:  $\text{Pd/C}, \text{H}_2$   
 $\text{H}_3\text{O}^+$  (-1)

2 pt for metal  
2 pt for  $\text{H}_2$

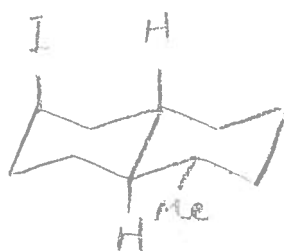
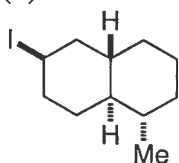
5. Draw the most stable conformation of the following molecules. (3 pts each)

(1)



Draw enantiomer (-1)

(2)

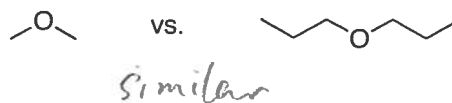


wrong stereocenter (-1)

6. Compare the strength of the indicated intermolecular interactions of the following molecules (2 pts each). Use stronger, weaker, or similar.

(1)

dipole dipole interaction:



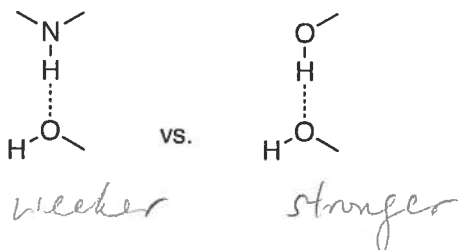
similar

van der Waals force:

weaker stronger

(2)

hydrogen bond:

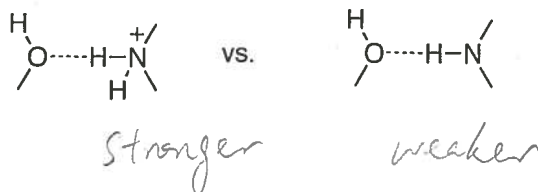


weaker

stronger

(3)

hydrogen bond:



stronger

weaker