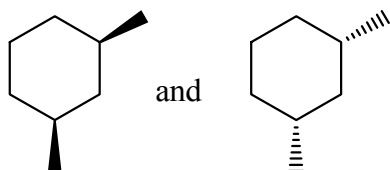
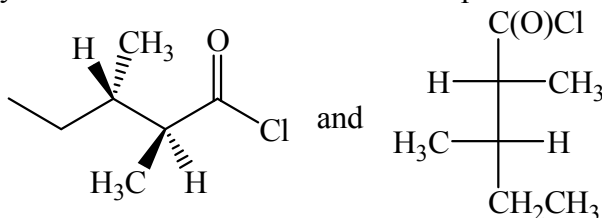




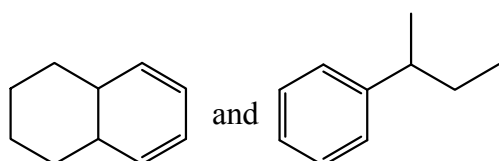
2. (10 pts. total; 2 pts. each) Identify each pair as **STRUCTURAL**, **CONFIGURATIONAL**, or **CONFORMATIONAL** isomers, **SAME**, or **UNRELATED** structures. Write your answer on the line below each pair.



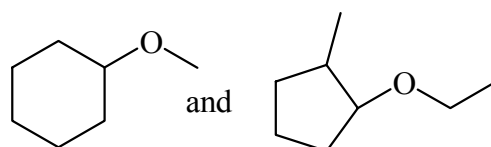
**SAME**



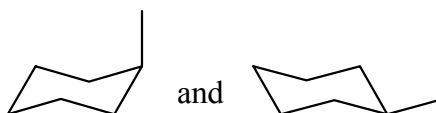
**CONFIGURATIONAL**



**STRUCTURAL**

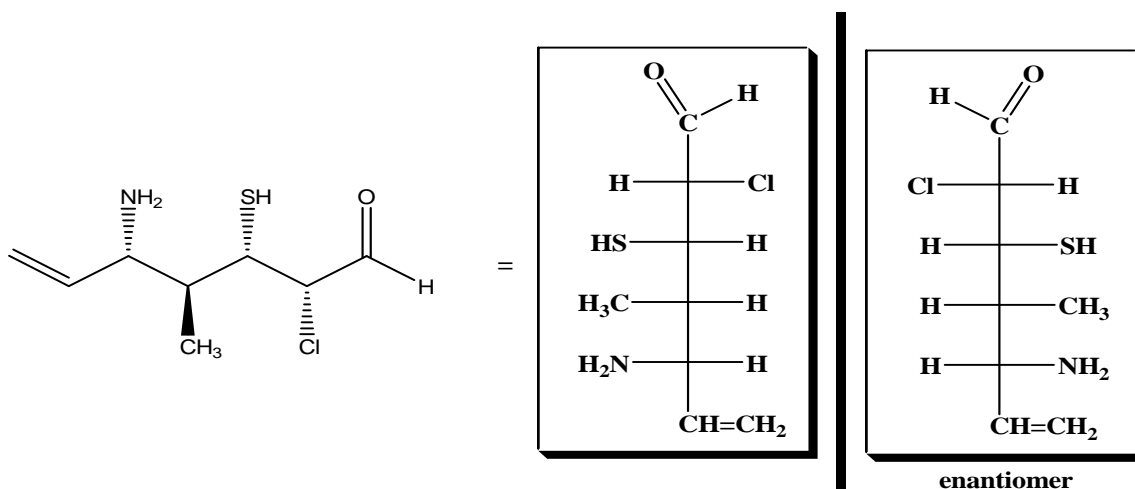


**UNRELATED**



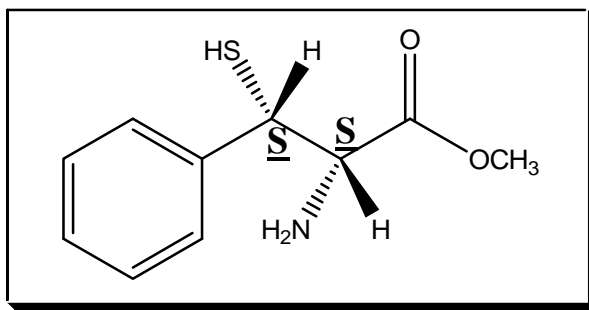
**CONFORMATIONAL**

3. (8 pts.) Draw a Fischer projection on the right to correspond to the given structure on the left.

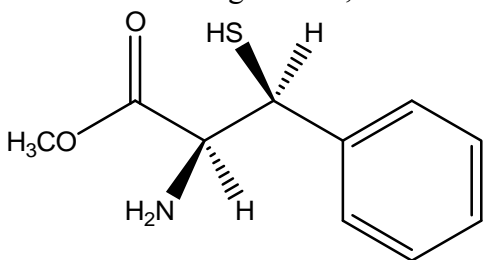


Now draw ONE ENANTIOMER of your Fischer projection. **see above**

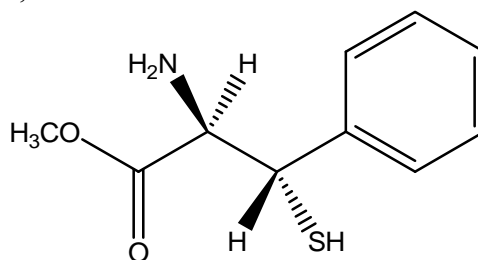
4. (10 pts. total) Consider the molecule shown:



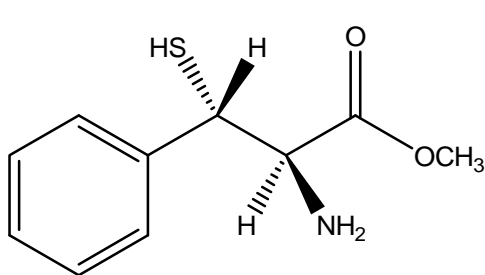
- A. (2 pts.) Determine the absolute configuration (R/S) at each stereocenter. Label these in the structure above.
- B. (8 pts.) Now label each structure below compared to that in the box by writing **SAME**, **ENANTIOMER**, or **DIASTEREOMER** on the lines.



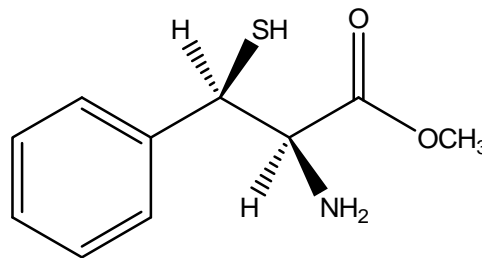
**SAME**



**DIASTEREOMER**

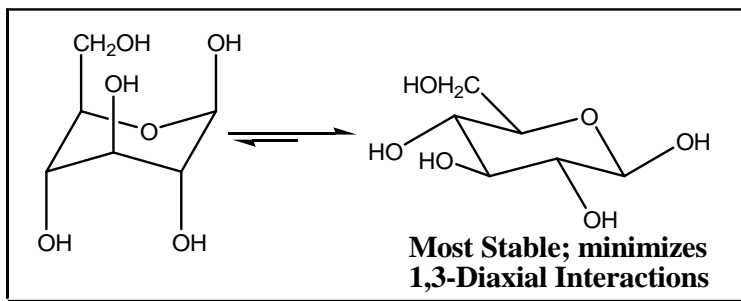
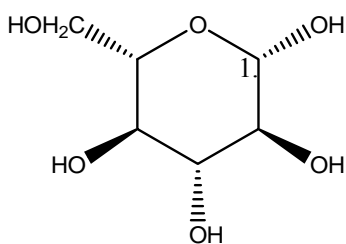


**DIASTEREOMER**



**ENANTIOMER**

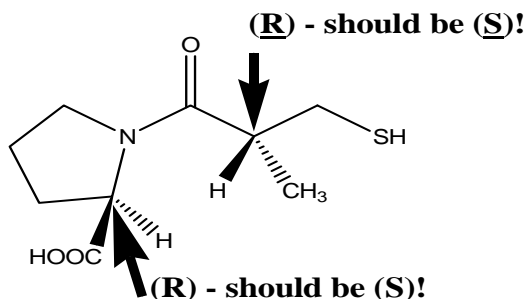
5. (7 pts.) Draw BOTH chair conformations of  $\beta$ -D-Glucopyranose, a molecule of future discussion, beginning with carbon 1 assigned below. Which conformation is the most stable? Briefly explain.



6. (10 pts. total; 1 pt. each) **TRUE AND FALSE!** Beside each statement below, write **True** if the statement is true or **False** if the statement is false.

\_\_\_ **T** \_\_\_ A. A pair of enantiomers rotates plane polarized light by equal amounts.

\_\_\_ **F** \_\_\_ B. The enantiomer of *Captopril* shown below is effective for the treatment of high blood pressure and congestive heart failure.



\_\_\_ **T** \_\_\_ C. The **(R)**-enantiomer of *Ibuprofen* is biologically inactive in human bodies.

\_\_\_ **T** \_\_\_ D. The **(S)**-enantiomer of *Thalidomide* is teratogenic, where birth defects in infants are observed if taken during the first trimester of pregnancy.

\_\_\_ **F** \_\_\_ E. A secondary carbocation is more stable than a tertiary carbocation.

\_\_\_ **F** \_\_\_ F. Functional groups are not responsible for the physical properties of a compound.

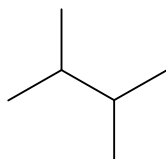
\_\_\_ **F** \_\_\_ G. The nitrogen atom of a tertiary amine is directly bonded to one hydrogen atom.

\_\_\_ **T** \_\_\_ H. Cyclobutane exhibits unusually strained C-C bonds due to its 90° bond angle.

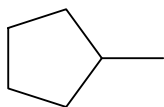
\_\_\_ **F** \_\_\_ I. An **(R)**-enantiomer typically rotates light in the (-) dextrorotatory direction.

\_\_\_ **T** \_\_\_ J. A racemic mixture does not rotate plane polarized light.

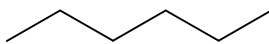
7. (10 pts.) Consider the following five boiling points: 57.9 °C; 60.2 °C; 68.7 °C; 71.8 °C; and 80.7 °C. Match the given boiling points with each compound listed below, and briefly explain your assignments.



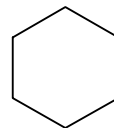
**57.9 °C**



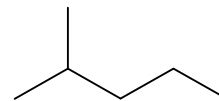
**71.8 °C**



**68.7 °C**



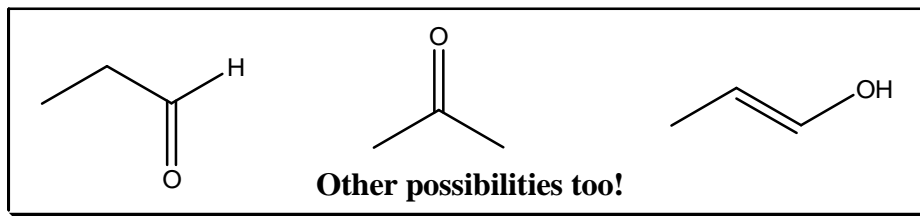
**80.7 °C**



**60.2 °C**

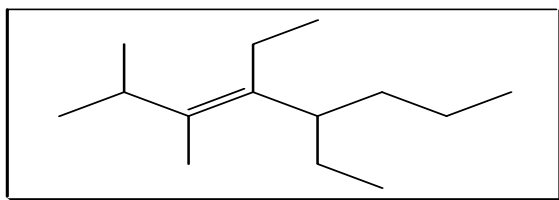
**Branched chain alkanes tend to be more compact, which reduces the amount of contact between the molecules and thus lowers the boiling point. Because rotation around carbon bonds is restricted in cycloalkanes, they maintain a rigid structure and hence possess higher boiling points.**

8. (6 pts. total) Draw three constitutional isomers WITH VARYING FUNCTIONAL GROUPS having the molecular formula  $C_3H_6O$  using bond-line notation.

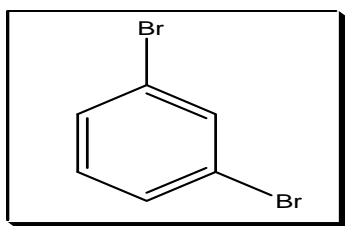


9. (15 pts. total; 3 pts. each) **NOMENCLATURE!** Use the appropriate IUPAC notation to name/draw each of the organic structures below:

- A. *trans*-4,5-diethyl-2,3-dimethyl-3-octene



- B. *m*-dibromobenzene

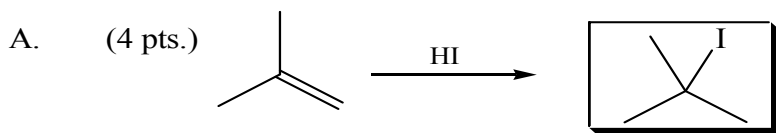


- C. **7-ethyl-3-methyl-4-nonyn-2-ol**

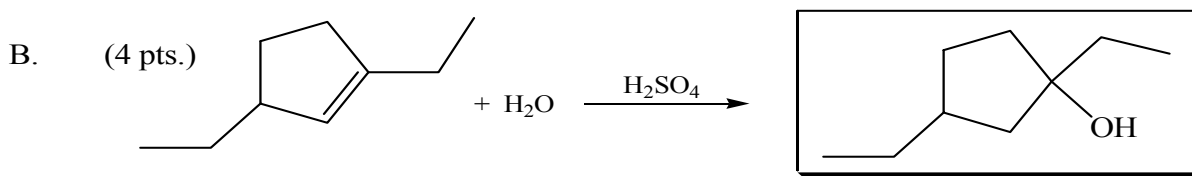
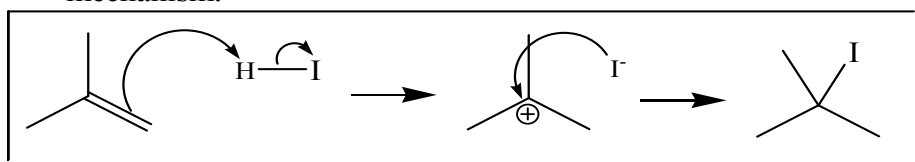
- D. ***cis*-2,3,6-trimethyl-4-octene**

- E. **4-ethyl-6-methylcycloheptene**

10. (12 pts. total) **REACTIONS AND MECHANISMS!** Predict the MAJOR product for the reactions listed below, and give the appropriate curved arrow notation where requested.



mechanism:



mechanism:

