name _____

Multiple Choice. Choose the best answer for the following questions. (10 questions, 40 pts)

1. Calculate the degrees of unsaturation for a molecule with the molecular formula $C_9H_{10}FNO_3$

   (a) 0
   (b) 3
   (c) 4
   (d) 5
   (e) 6

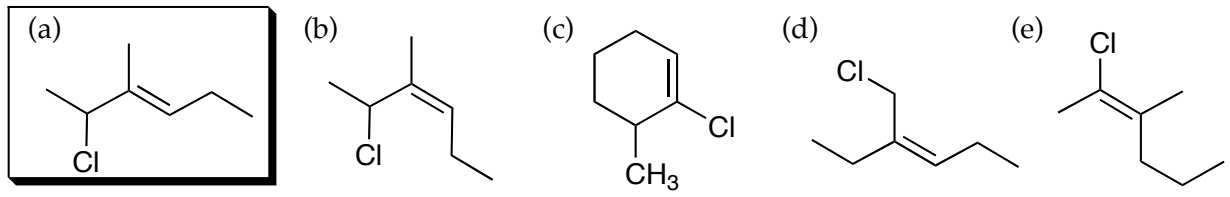
2. A reaction A ⇌ B occurs in a single step and has a ΔG° of 50 KJ/mol. According to the Hammond Postulate, the structure of the transition state for this reaction would most resemble:

   (a) the reactant, A
   (b) the product, B
   (c) it would be an equal hybrid of A and B
   (d) the reaction intermediate
   (e) there is no way to predict the structure of a transition state

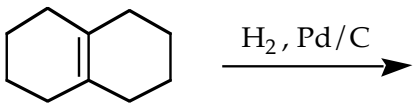
3. Increased substitution stabilizes an alkene due to hyperconjugation. Hyperconjugation involves a bonding interaction between an adjacent C-H σ-orbital with...

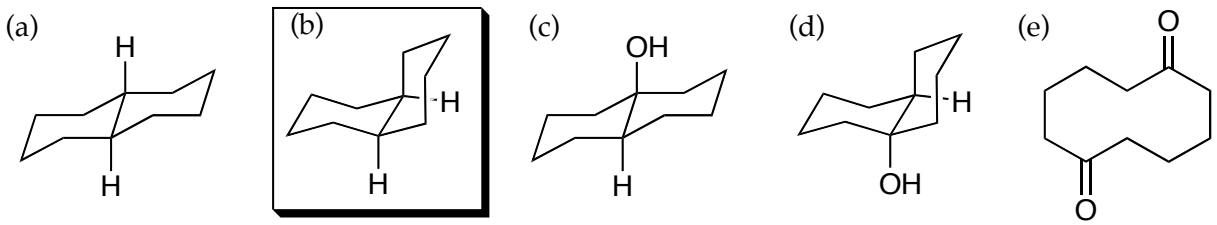
   (a) the alkene π-orbital
   (b) the alkene π*-orbital
   (c) the alkene σ-orbital
   (d) the alkene σ*-orbital
   (e) an unhybridized p-orbital

4. Which of the following is (E)-2-chloro-3-methyl-3-hexene?



5. Which of the following would be the product of the reaction shown below?





6. The pKa of acetylene is 25. Which of the following bases could be used to generate the acetylide anion?

(a) H_3C^- (pKa of CH_4 = 60)
(b) H_3N^- (pKa of NH_3 = 35)
(c) CH_3O^- (pKa of CH_3OH = 16)
(d) all of the above
(e) a and b only

7. Which of the following reagents must be used with HBr to convert 1-hexene to 1-bromohexane?

(a) HSO_3^-
(b) $NaBH_4$
(c) ROOR
(d) Pd/C
(e) no other reagent is necessary.

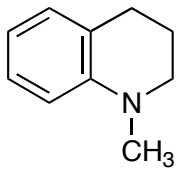
8. Which of the following statements concerning a carbocation is not true?

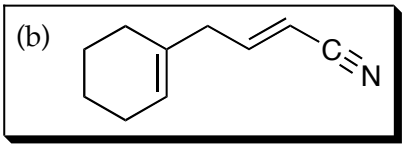
(a) the hybridization is sp2.
(b) the geometry is trigonal planar.
(c) they are stabilized by hyperconjugation.
(d) they cannot be observed, isolated or trapped.
(e) statements (a)-(d) are all true.

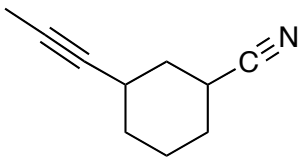
9. Which of the following molecules is in the highest oxidation states?

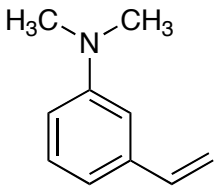
(a) an carboxylic acid.
(b) an alcohol.
(c) an aldehyde.
(d) an alkane.
(e) all are in the same oxidation state.

10. An organic molecule has a molecular formula of $C_{10}H_{13}N$. Upon hydrogenation of this molecule with Pd/C, it reacts with 2 mol equivalents of H_2. Hydrogenation with Lindlar's catalysts gives no reaction. Which of the following structures is constant with this information?

(a) 

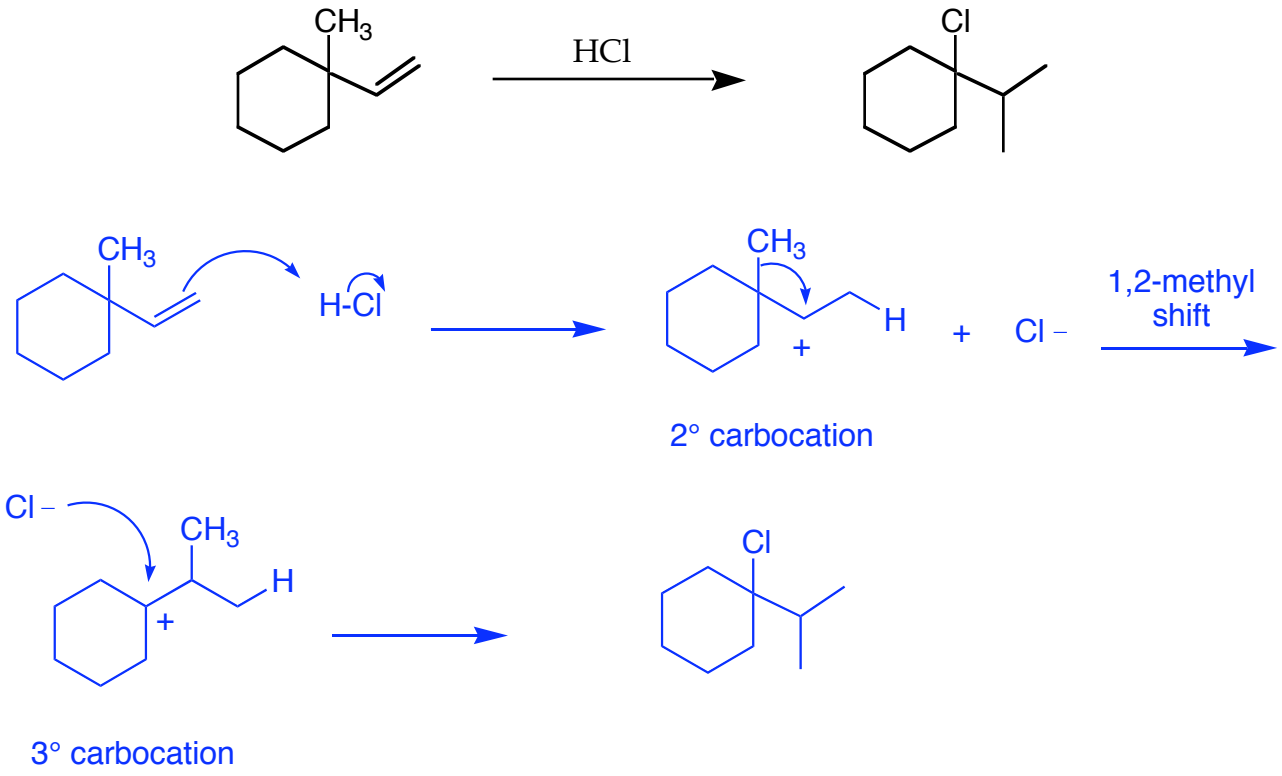
(b) 

(c) 

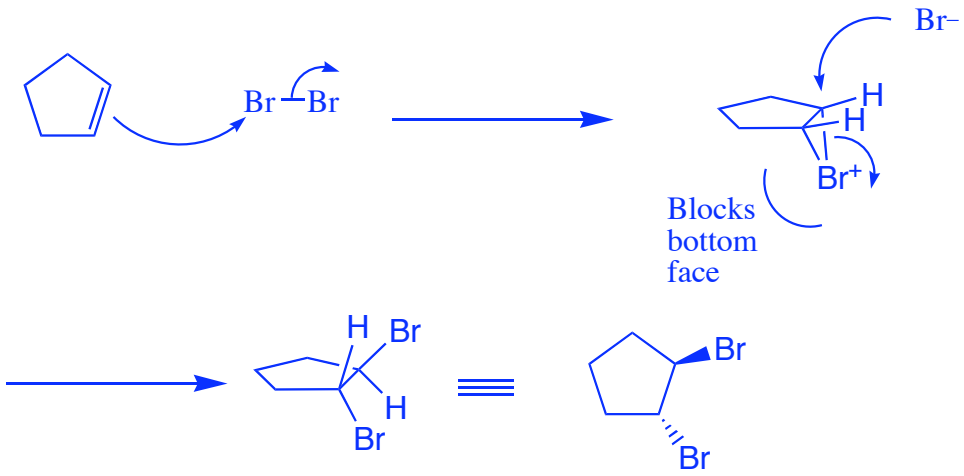
(d) 

(e) all structures are constant with the information given

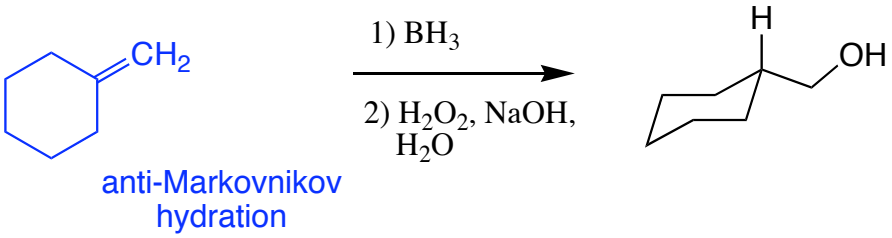
11. Draw a complete mechanism for the following reaction. (8 pts)

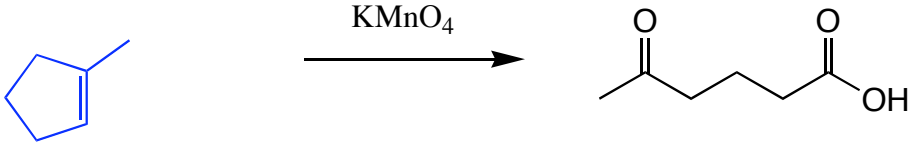


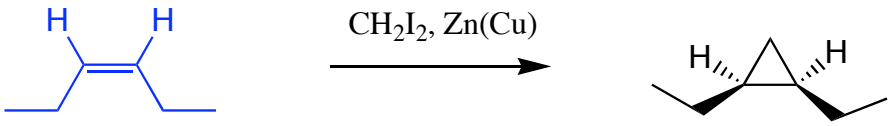
12. Give the product and complete mechanism for the reaction of Br_2 with cyclopentene in H_2O. Your mechanism should clearly show any stereochemical preference. (8 pts)



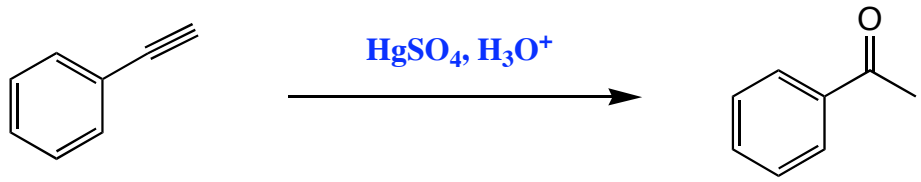
13. Given the alkene or alkyne reactant needed to obtained the product via the reaction shown below. (12 pts)

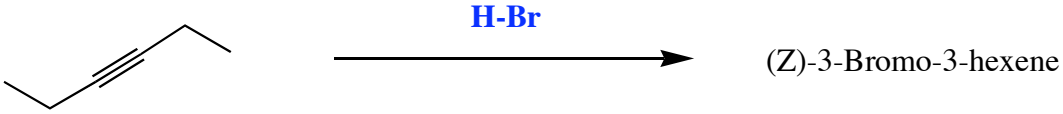


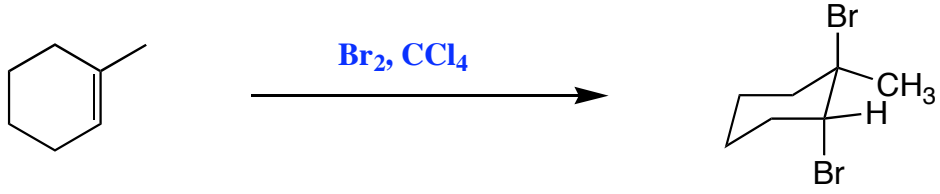




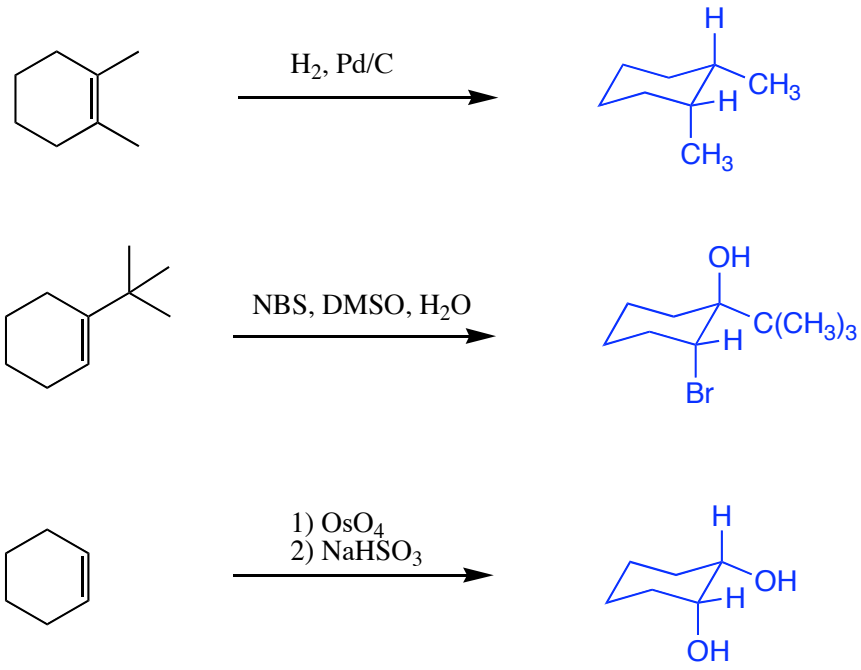
14. Give the reagent(s) required to complete the following reactions. (12 pts)



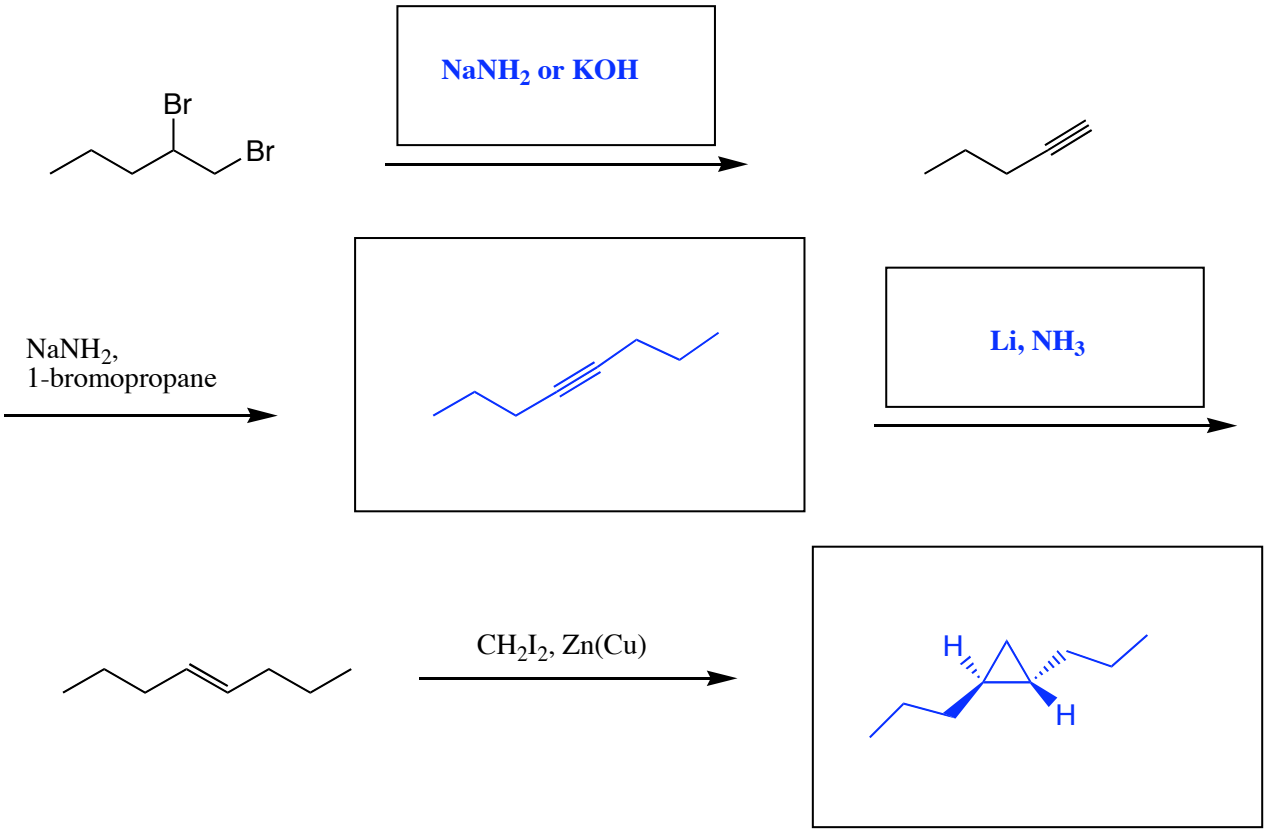




15. Give the product for each of the following reactions. *Draw the product in its most stable chair conformation.* (12 pts)



16. Fill in the required intermediate products and reagents necessary to complete the following synthesis. (8 pts)



Problem	1-10:_____	(40 pts)
	11:_____	(8 pts)
	12:_____	(8 pts)
	13:_____	(12 pts)
	14:_____	(12 pts)
	15:_____	(12 pts)
	16:_____	(8 pts)

Total out of 100: _____