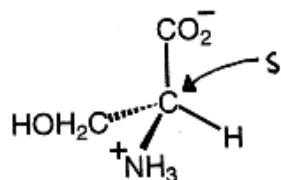


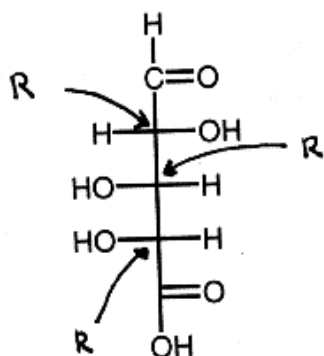
Question 1 (10 points)

Name key

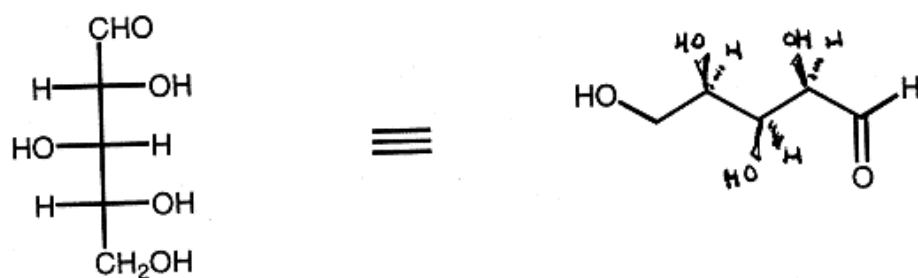
- a. (3 pts) Assign an **R** or **S** configuration to each stereogenic center in the following molecule.



- b. (3 pts) Assign an **R** or **S** configuration to each stereogenic center in the following molecule.



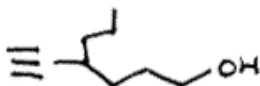
- c. (4 pts) Complete the bond-line (carbon skeleton) drawing for the molecule below.



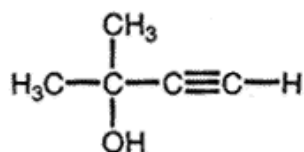
Question 2 (13 points)

Name key

- a. (3 pts) Draw the structure for 4-propyl-5-hexyn-1-ol.

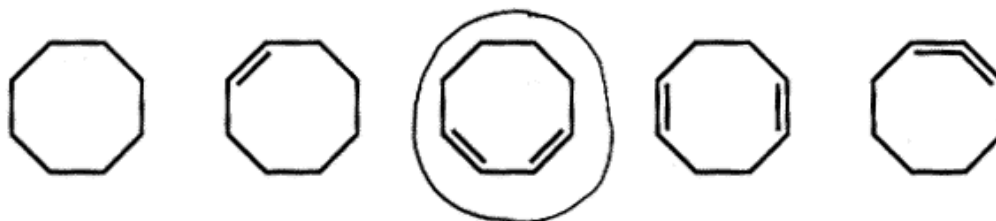


- b. (3 pts) What is the IUPAC name for the following molecule?

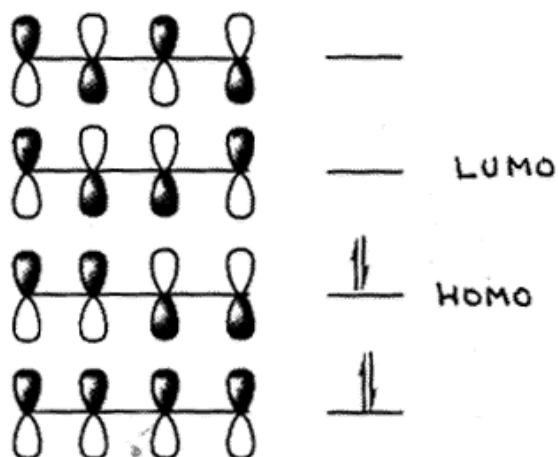


2-methyl-3-butyn-2-ol

- c. (3 pts) Circle the conjugated alkene.



- d. (4 pts) Identify the HOMO and the LUMO in the following molecular orbital diagram.

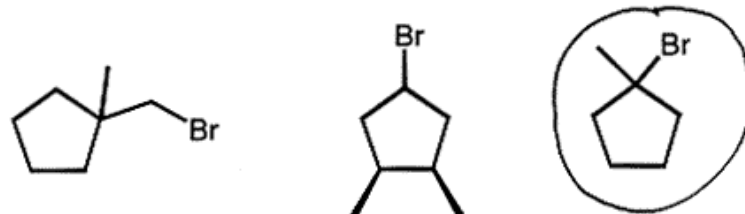


Question 3 (15 points)

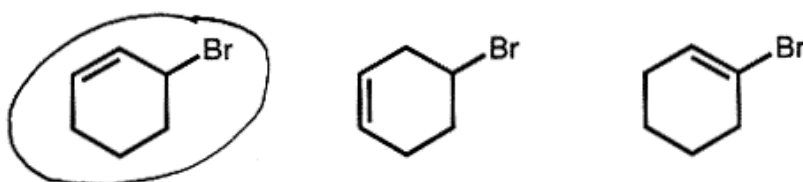
Name key

For each of the following sets of structures, choose the compound that best fits the description.

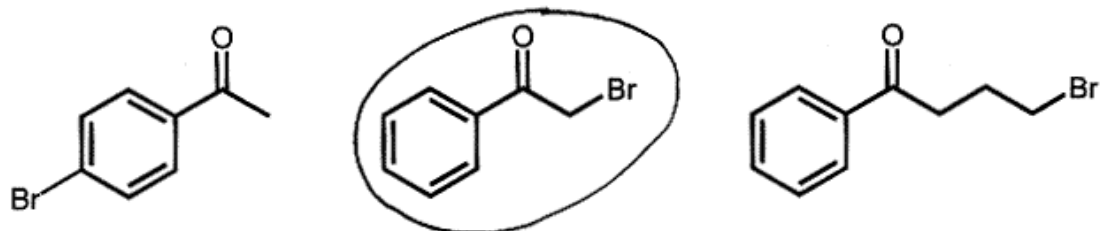
a. (3 pts) Reacts most rapidly under S_N1 conditions:



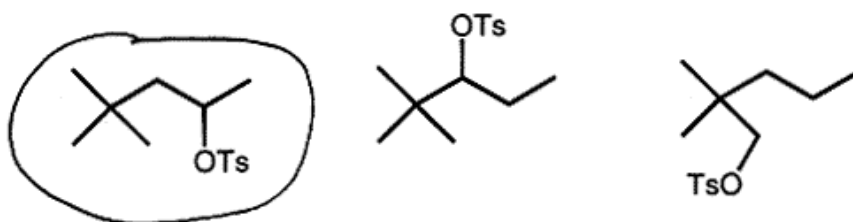
b. (3 pts) Reacts most rapidly with NaI in acetone solvent:



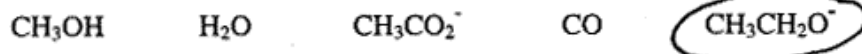
c. (3 pts) Reacts most rapidly with NaI in acetone solvent:



d. (3 pts) Reacts most rapidly with NaN_3 in acetone solvent:



e. (3 pts) Is the best nucleophile:

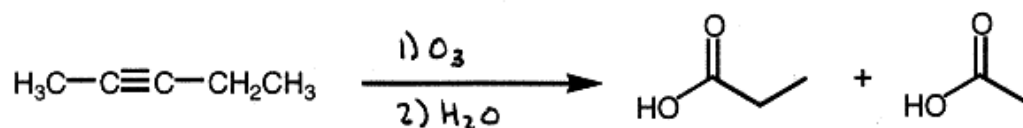


Question 4 (10 points)

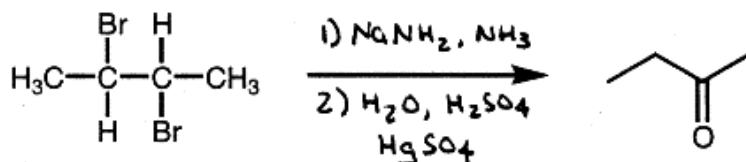
Name key

Provide the missing reagents for the following transformations. If more than one synthetic step is necessary, the reagents should be listed in order of use.

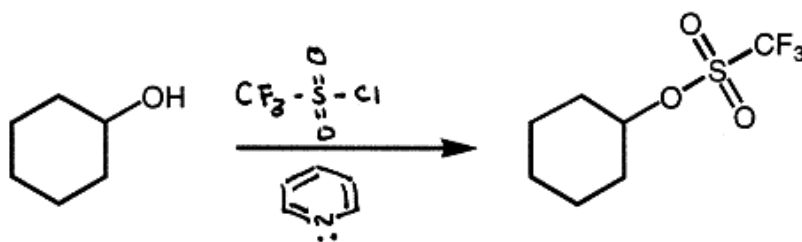
a. (3 pts)



b. (4 pts)



c. (3 pts)

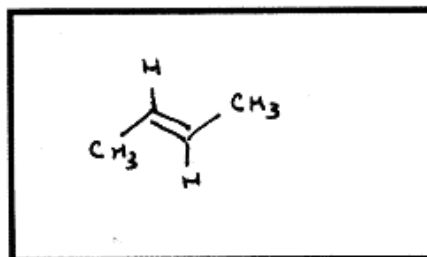
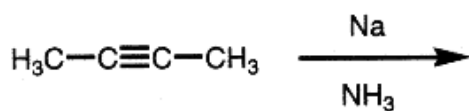


Question 5 (12 points)

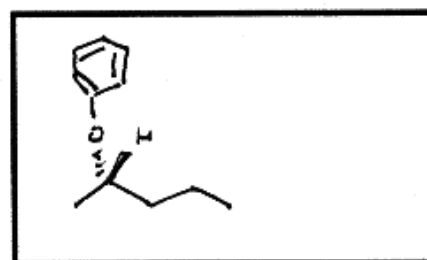
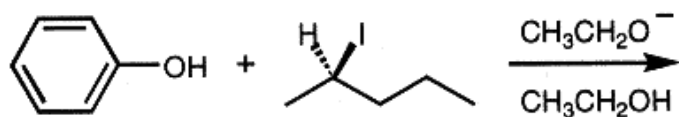
Name Key

Give the complete structure of the major organic product(s) for the following reactions. Put your answer in the box provided. Be sure to indicate stereochemistry where appropriate

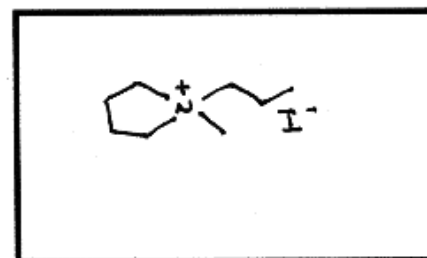
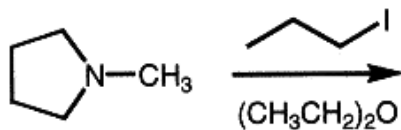
a. (3 pts)



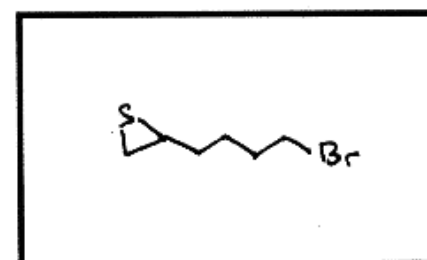
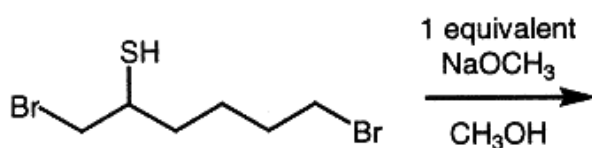
b. (3 pts)



c. (3 pts)



d. (3 pts)

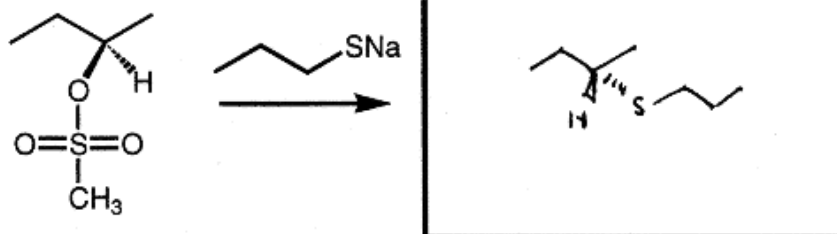


Question 6 (14 points)

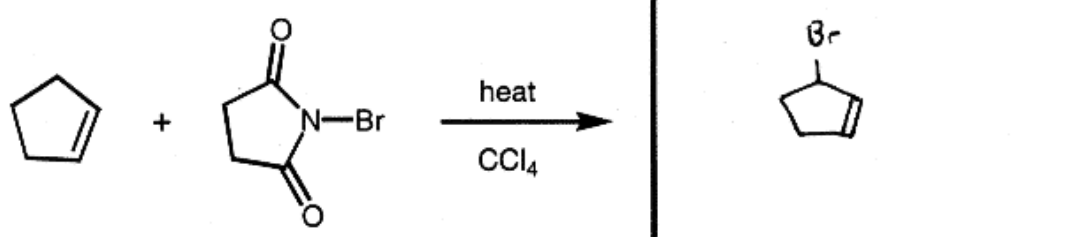
Name key

Give the complete structure of the major organic product(s) for the following reactions. Put your answer in the box provided. Be sure to indicate stereochemistry where appropriate

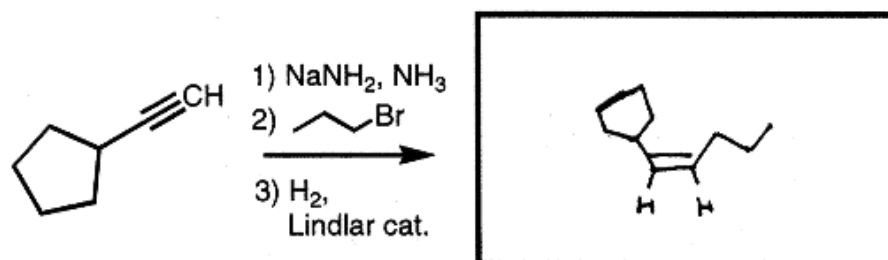
a. (3 pts)



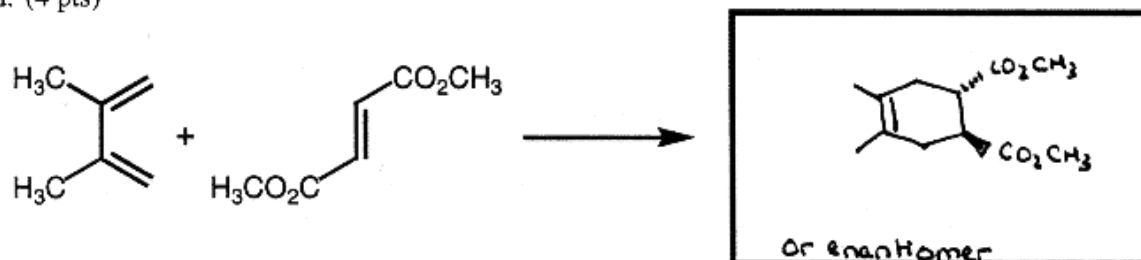
b. (3 pts)



c. (4 pts)



d. (4 pts)

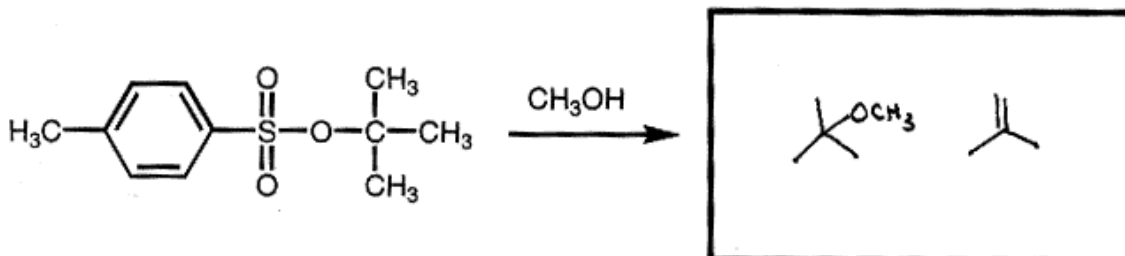


Question 7 (10 points)

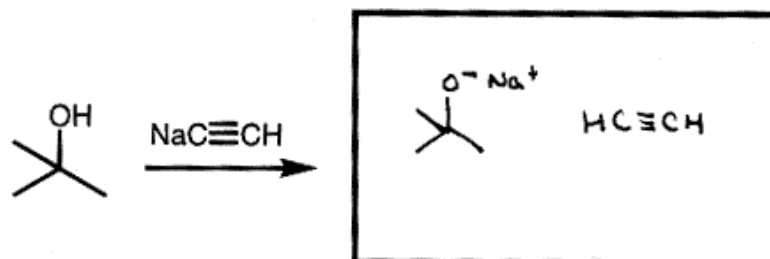
Name key

Give the complete structure of the major organic product(s) for the following reactions. Put your answer in the box provided. Be sure to indicate stereochemistry where appropriate.

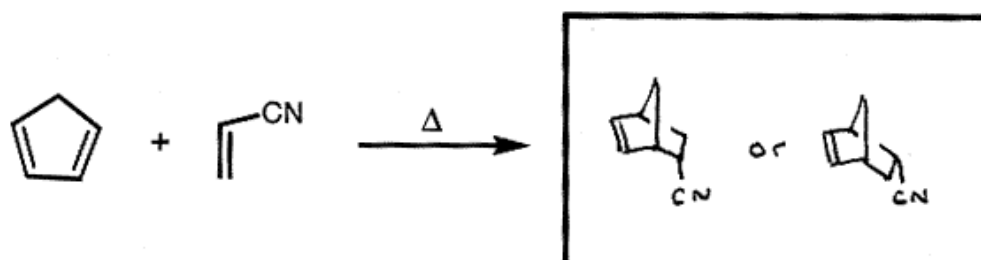
a. (3 pts)



b. (3 pts)



c. (4 pts)

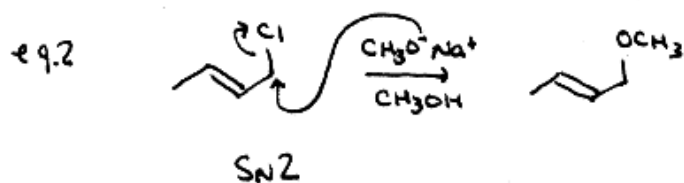
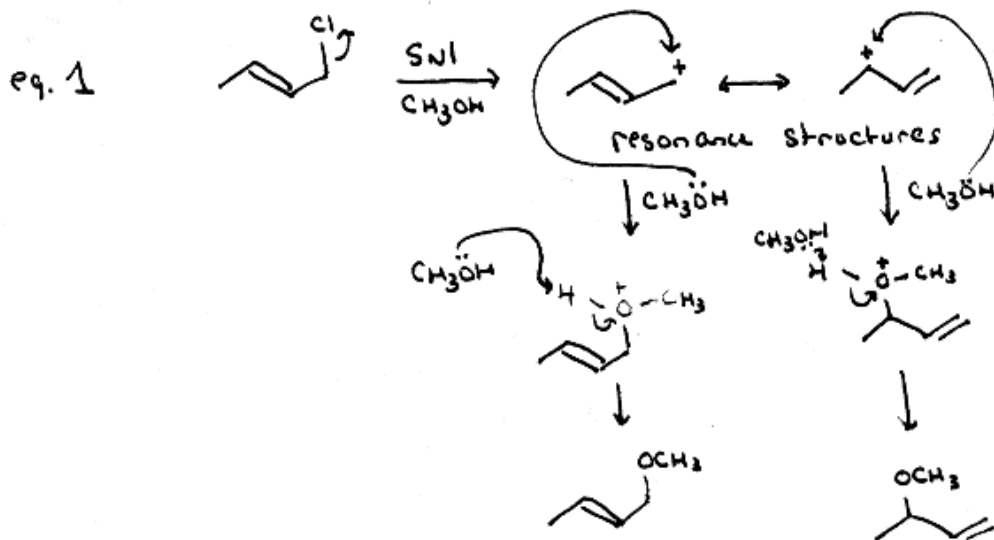
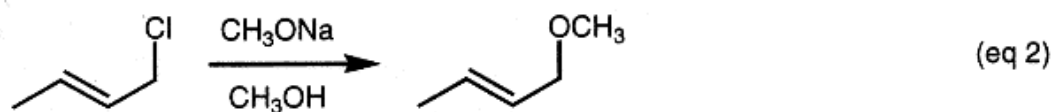
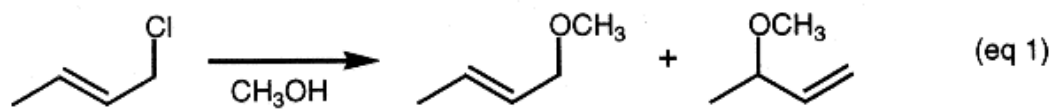


Question 8 (8 points)

Name key

Explain the following observations using structures, equations, curved arrows, and a minimum amount of prose.

When 1-chloro-2-butene is heated in methanol in the absence of base, the products are 1-methoxy-2-butene **and** 3-methoxy-1-butene (eq1), but when sodium methoxide is present in the reaction mixture only 1-methoxy-2-butene is formed (eq 2).

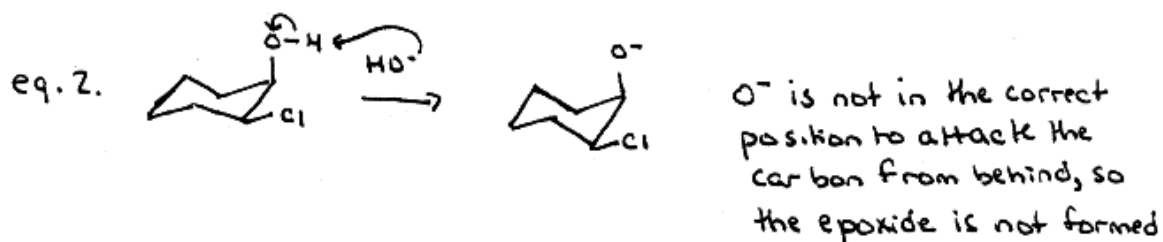
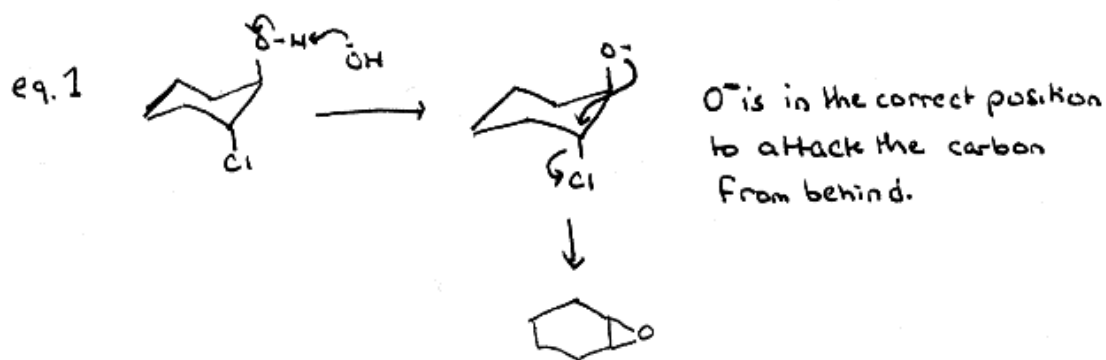
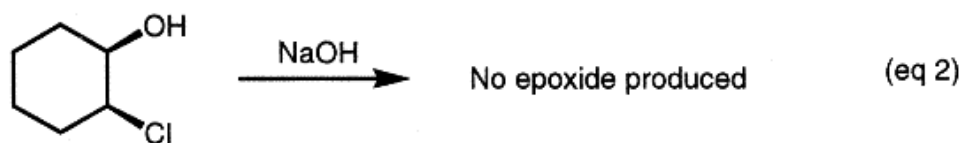
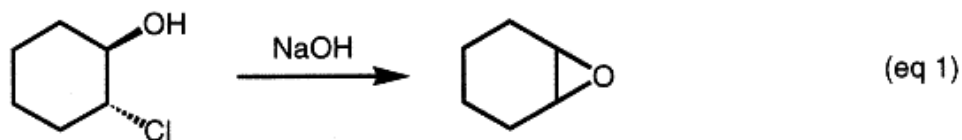


Question 9 (8 points)

Name Key

Explain the following observations using structures, equations, curved arrows and a minimum amount of prose.

When *trans*-2-chlorocyclohexanol is treated with sodium hydroxide, cyclohexeneoxide is formed (eq 1), but when *cis*-2-chlorocyclohexanol is treated with sodium hydroxide, the epoxide is **not** formed (eq 2).



ONLY ONE OF THE PROBLEMS ON THIS PAGE WILL BE GRADED.

- Using the correct curved arrow formalism, draw the correct mechanism for the reaction of 2-pentyne with Na, NH₃. Explain why the *trans* product is the only product formed.
- Draw a complete π molecular orbital picture, using the p-orbitals, of 2,4-dimethyl-1,3,5-hexatriene. Identify the HOMO and the LUMO.

ONLY ONE OF THE PROBLEMS ON THIS PAGE WILL BE GRADED.

