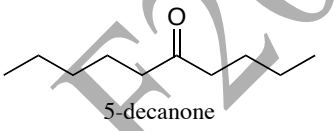
1-10. Multiple choice. Choose the *best* answer for the following questions. (40 pts)

1. (*Z*)-5-methyl-2-hexene can be prepared from 5-methyl-2-hexyne and . . .
   a) Li(0), NH_3, $(H_3C)_3COH$
   b) H_2NNH_2, NaOH
   c) H_2, Pd/C
   d) H_2, Lindlar's catalyst

2. 5-Decyne is converted to 5-decanone using . . .
   a) $KMnO_4$
   b) $Hg(SO_4)$, H_3O^+
   c) O_3, then Zn(0)
   d) CH_3CO_3H

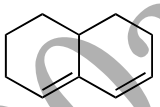


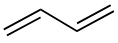
5-decanone

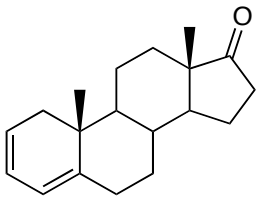
3. The addition of HCl to 2-methyl-1,3-butadiene at 70° C affords 1-chloro-3-methyl-2-butene as the major product. This reaction is an example of . . .
   a) thermodynamic control.
   b) kinetic control.
   c) Huckel's rule.
   d) Markovnikov's rule.

4. Which of the following contains a conjugated diene in the s-cis conformation?

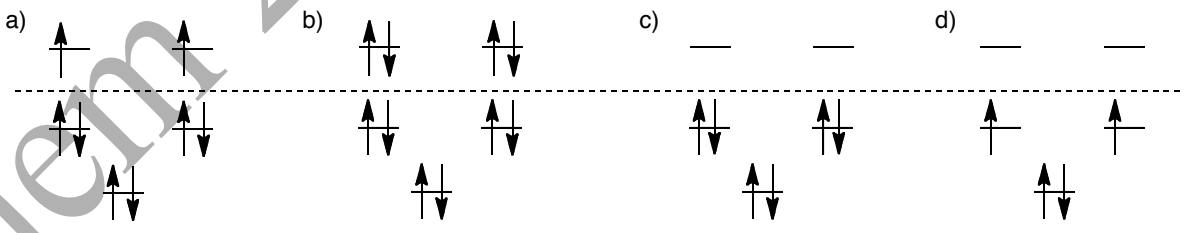
a) 

b) 

c) 

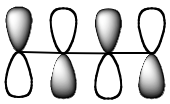
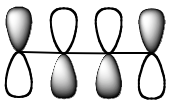
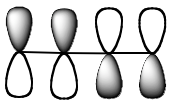
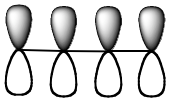
d) 

5. Which of the following represents the π-molecular orbital diagram of the cyclopentadienyl anion ($C_5H_5^-$)?

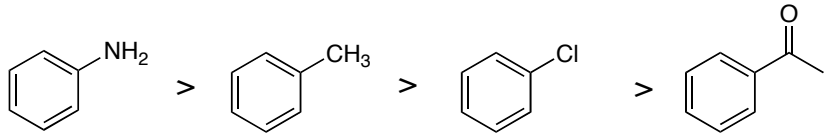


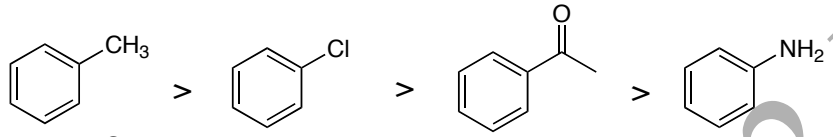
6. With respect to electrophilic aromatic substitution, a chloro substitutent is . . .
   a) an activating group and an ortho/para directors.
   b) an activating group and a meta directors.
   c) a deactivating group and an ortho/para directors.
   d) a deactivating group and a meta directors.

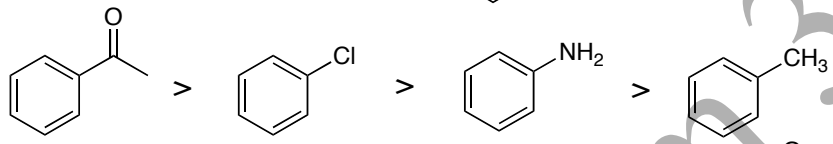
7. The lowest unoccupied molecular orbital of butadiene is . . .

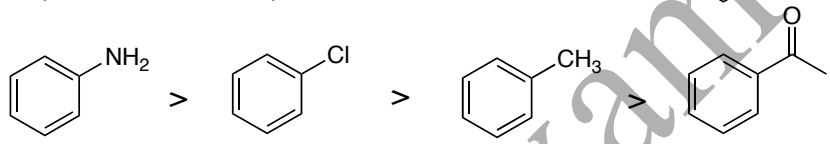
a)  b)  c)  d) 

8. Which is the correct order of reactivity toward electrophilic aromatic substitution from most reactive to least reactive?

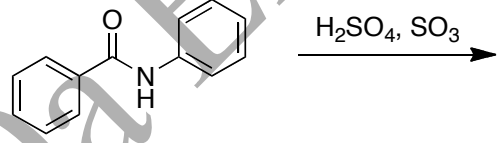
a. 

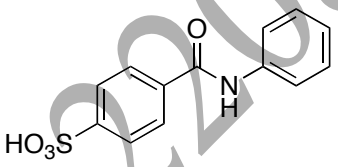
b. 

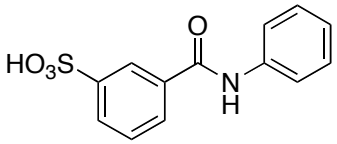
c. 

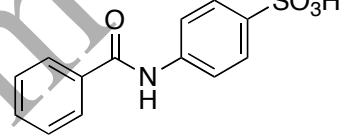
d. 

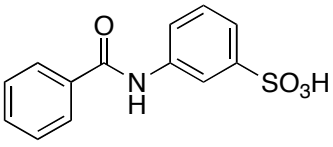
9. Which of the following would you expect to be the major product from the reaction below?



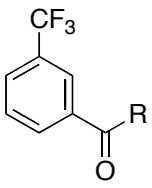
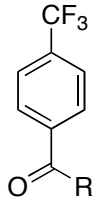
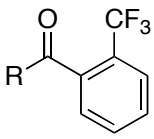
a) 

b) 

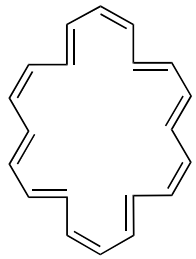
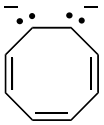
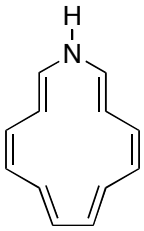
c) 

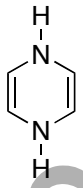
d) 

10. Friedel-Crafts acylation of (trifluoromethyl)benzene affords . . .

a)  b)  c)  d) no reaction

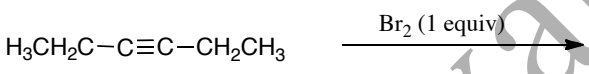
11. Describe each of the following as either aromatic or anti-aromatic. Assume each compound is planar. (8 pts)

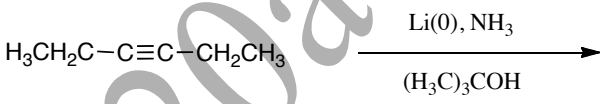




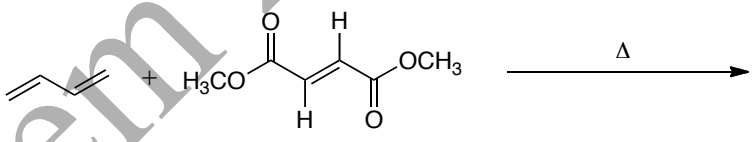


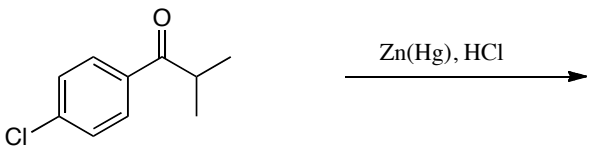
_____ _____ _____ _____

12. Provide the product for each of the following reactions. Clearly indicate the stereochemistry of the product when pertinent. (12 pts)

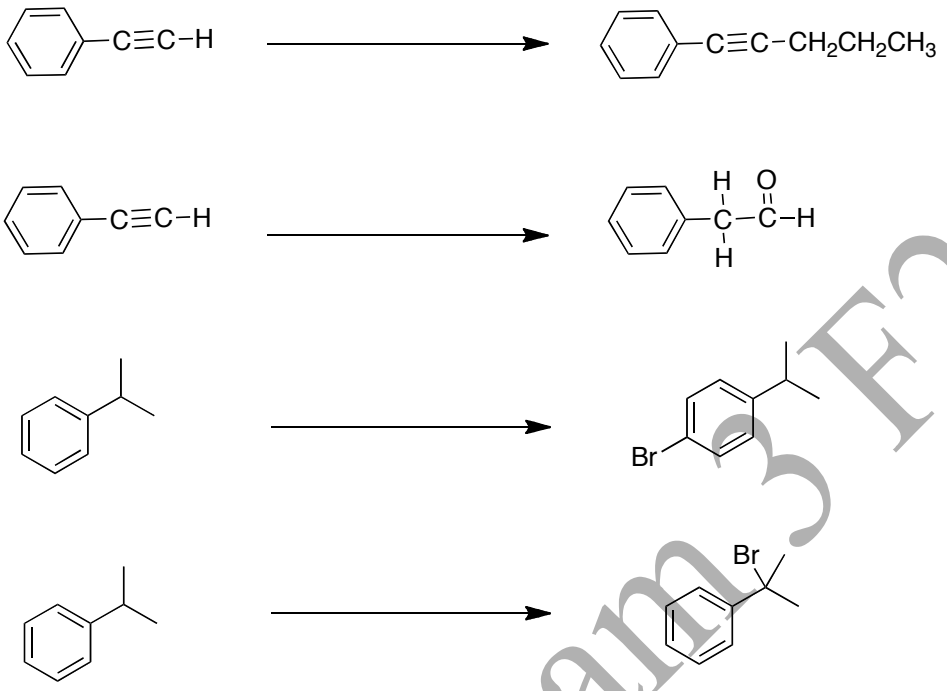




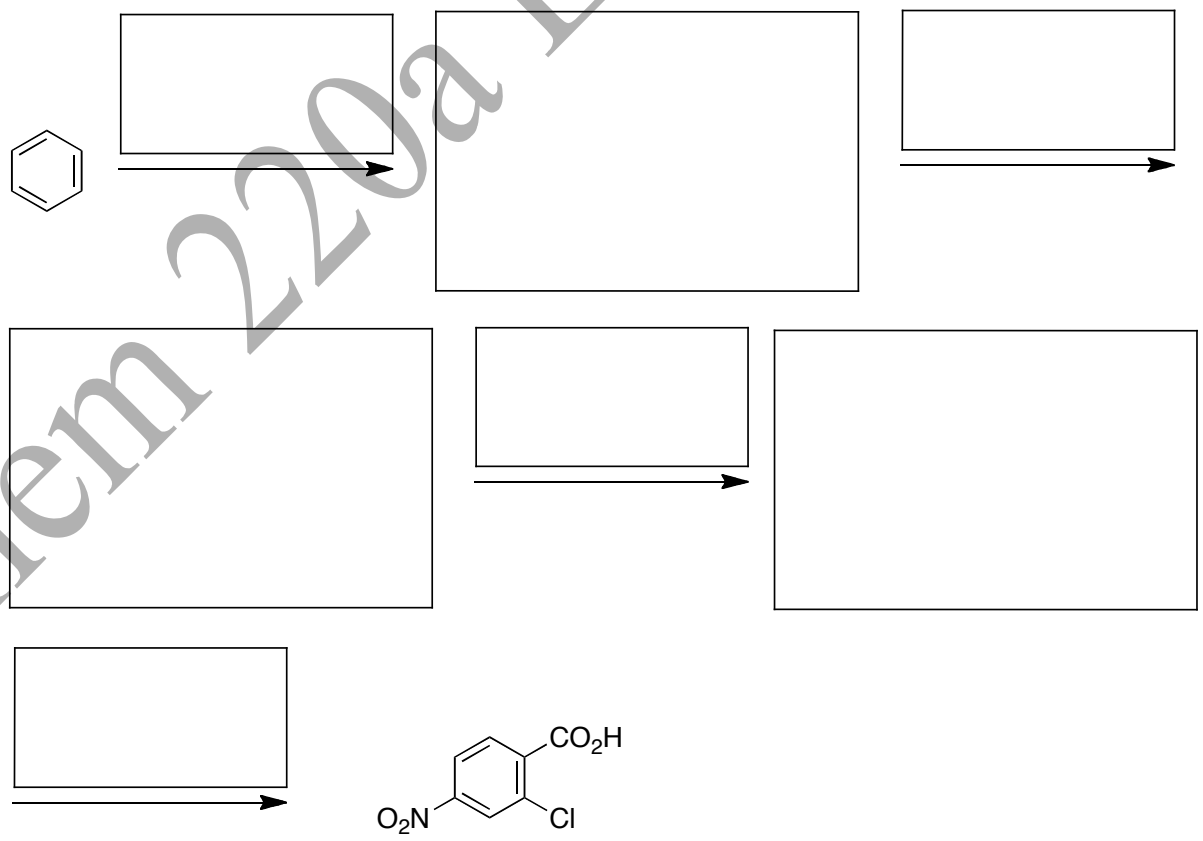




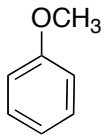
13. Provide the necessary reagent(s) for the following reactions. (12 pts)



14. Fill in the required intermediate products and reagents necessary to complete the following synthesis. (14 pts)



15. Give a complete mechanism for the nitration of anisole. Draw all resonance forms of the intermediate leading to the major product and the mechanism by which they interconvert. The mechanism should account for the directing effect of the original substituent. (14 pts)



anisole

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

Total out of 100: _____