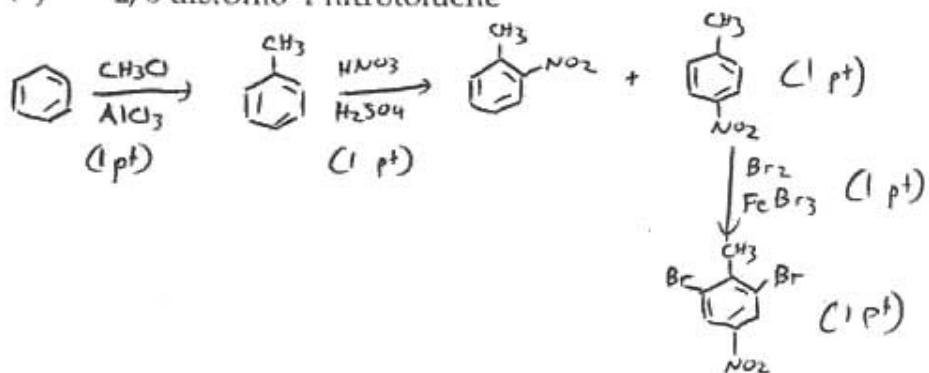
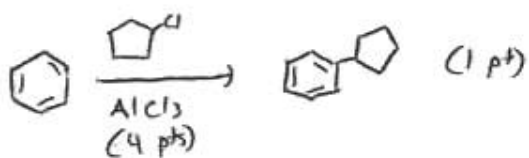


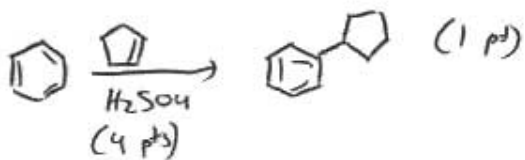
c) 2,6-dibromo-4-nitrotoluene



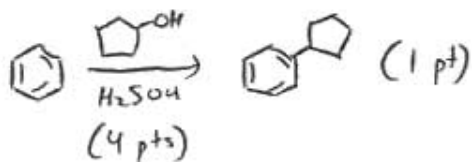
d) cyclopentylbenzene



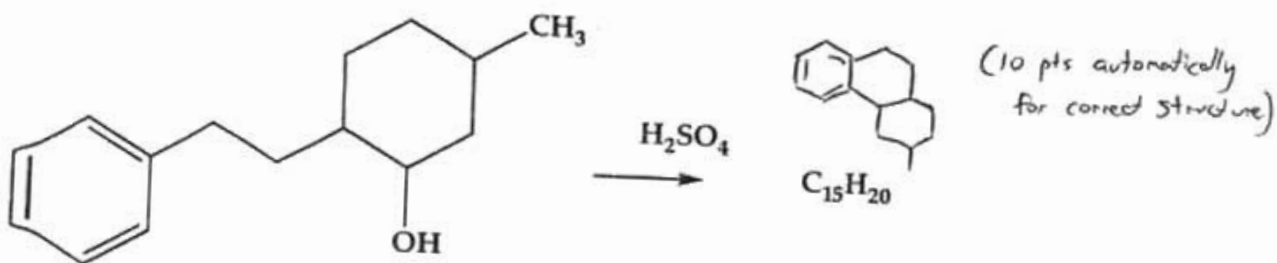
OR



OR



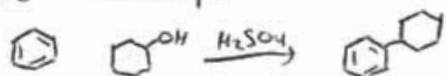
2. (10 pts) What is the product of the reaction? The $C_{15}H_{20}$ product does not react with I_2 in CCl_4



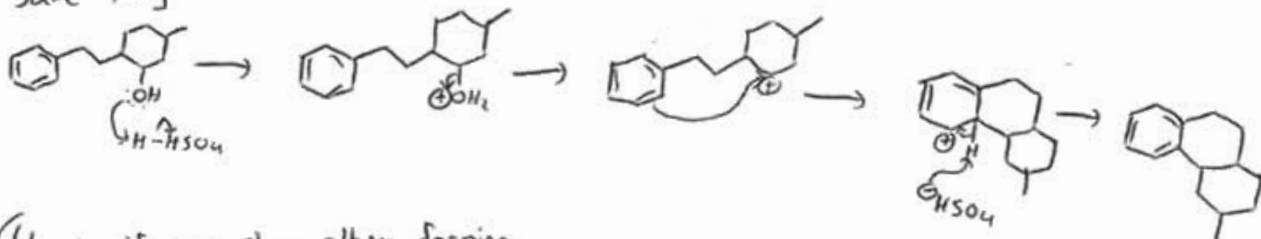
$C_{15}H_{20} = 6$ degrees unsaturation. Start with S_1 , so need to make a new ring or a new double bond.

No rxn with $Br_2/CCl_4 =$ no alkenes, so all we can do is make a new ring.

We've seen simpler reactions like this before:



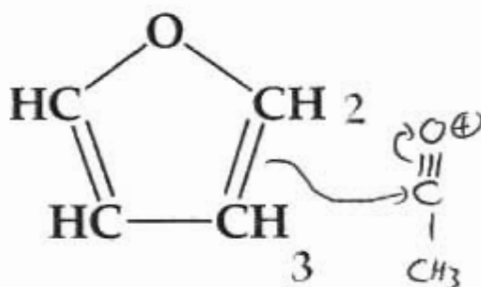
Same thing here.



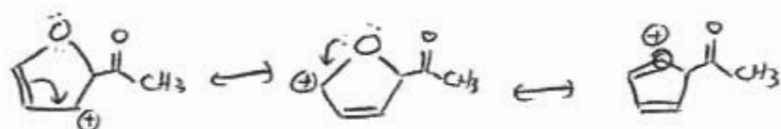
(4 pts if you show alkene forming, ~2 pts for each mechanism step)

3. (10 pts) 16.61

Furan is an aromatic heterocyclic compound that undergoes electrophilic aromatic substitution. Consider the Friedel Crafts acylation reaction. Will reaction occur at the 2 position or the 3 position? Why?

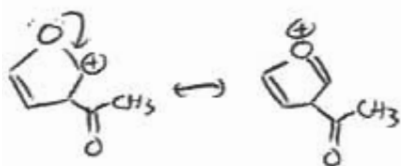


Reaction at 2 position:



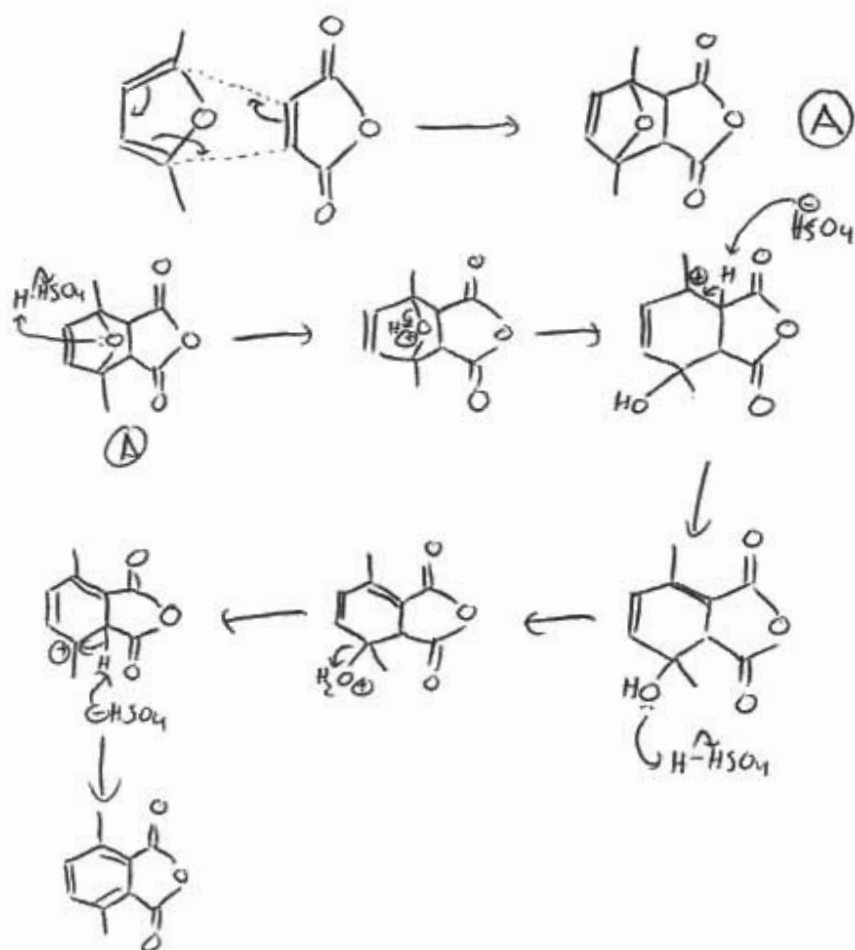
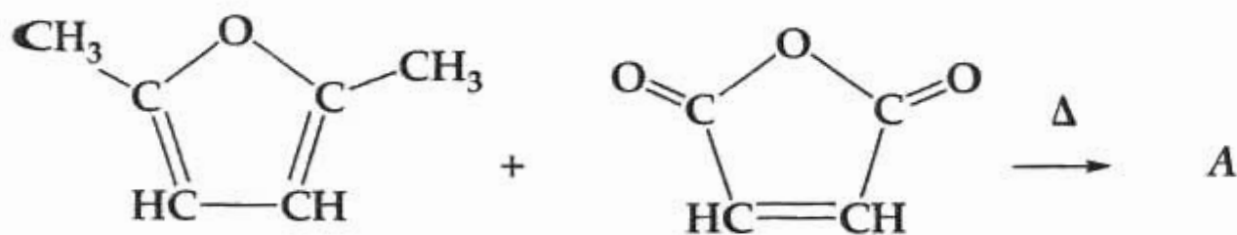
3 resonance forms, so this is the better outcome.

Reaction at 3 position:



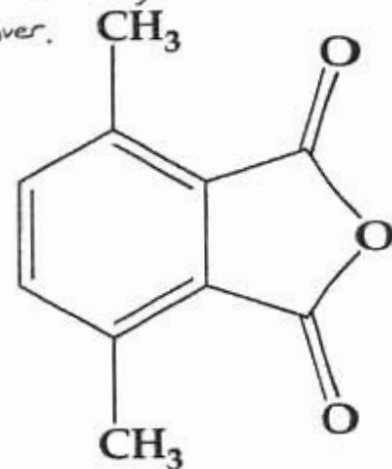
(2 pts for each correct resonance form, -2 pts if still chose position # 3)

1. (10 pts) 16.63 A Diels Alder reaction of 2,5-dimethylfuran and maleic anhydride gives adduct A that undergoes acid-catalyzed dehydration to give 3,6 dimethyl-phthalic anhydride. What is the structure of A? What is the mechanism of conversion of A to 3,6 dimethyl-phthalic anhydride?

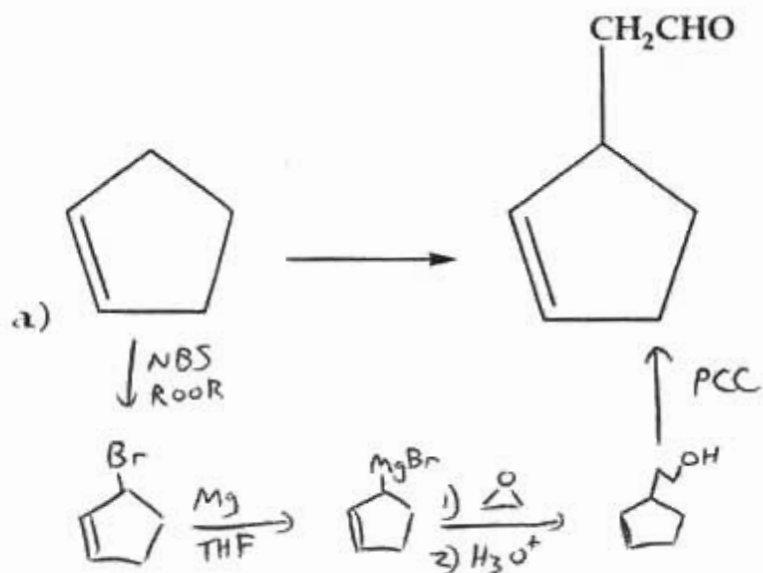


From here, mechanism is similar to acid-catalyzed elimination of alcohols, just twice over.

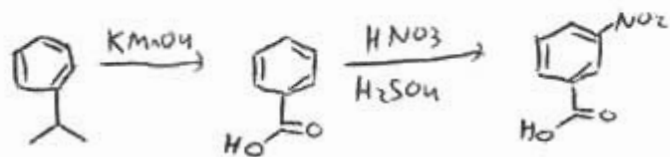
H₂O +

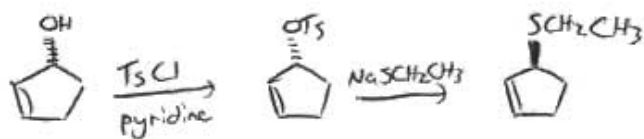
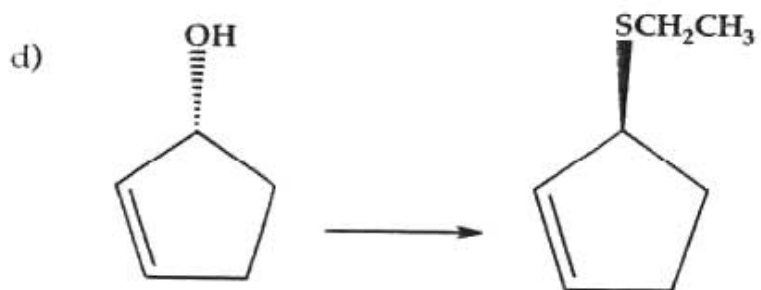
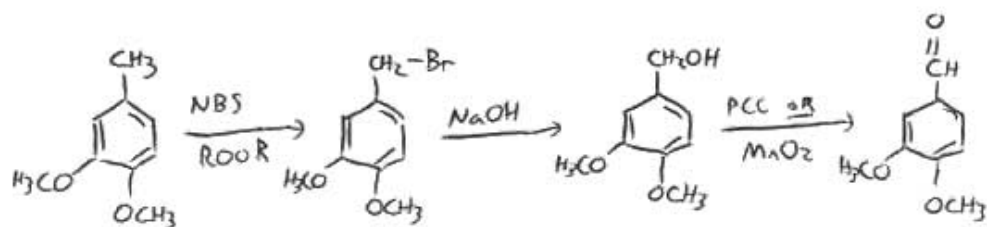
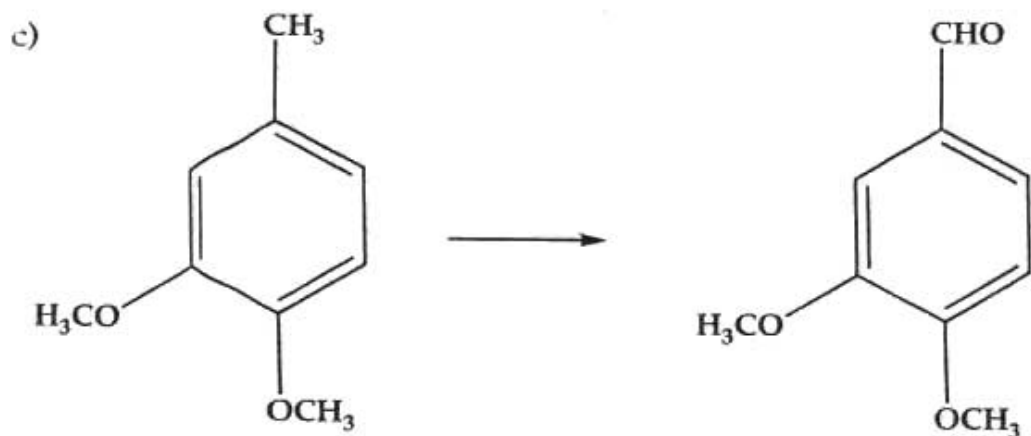


7. (20 pts) 17.24 Outline a synthesis of each of the following:



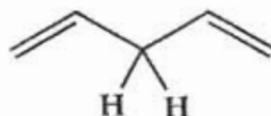
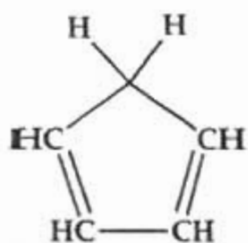
b) isopropylbenzene \rightarrow *m*-nitrobenzoic acid





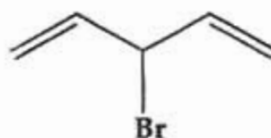
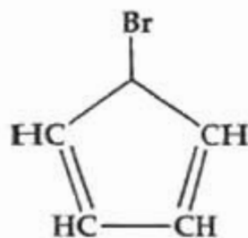
(2. (10 pts) 17.36 Account for the following facts.

a) 1,3-cyclopentadiene is a much stronger acid than is 1,4-pentadiene.



1,4-pentadiene

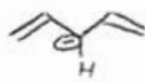
b) 3-bromo-1,4-pentadiene undergoes solvolysis readily in protic solvents but 5-bromo-1,3-cyclopentadiene is virtually inert.



a) After losing an H^+ :



$6\pi e^- = \text{aromatic} = \text{very stable}$



OK, but not aromatic. Doubly allylic though.

b) After losing a Br^- :



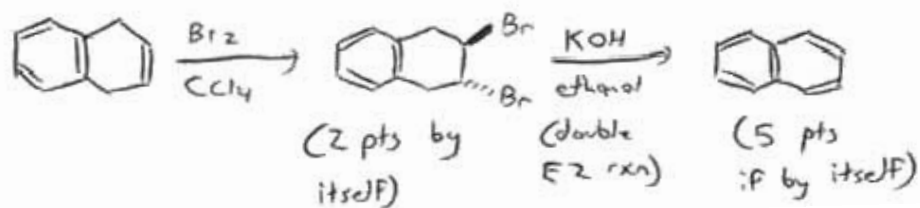
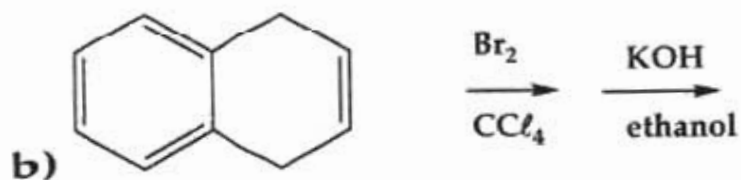
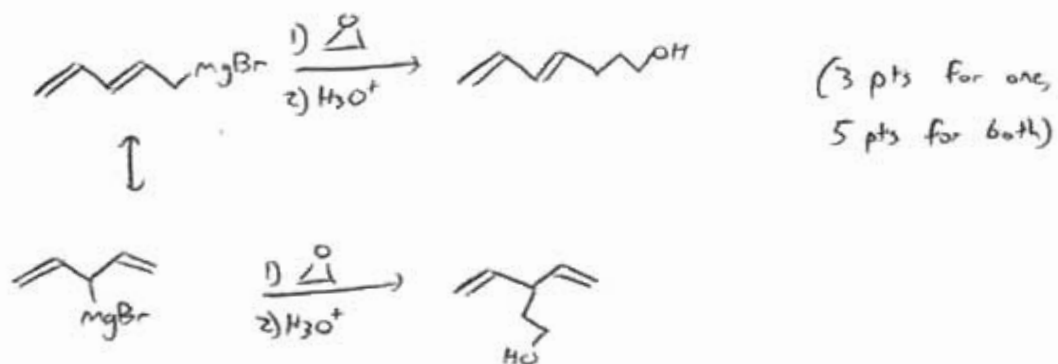
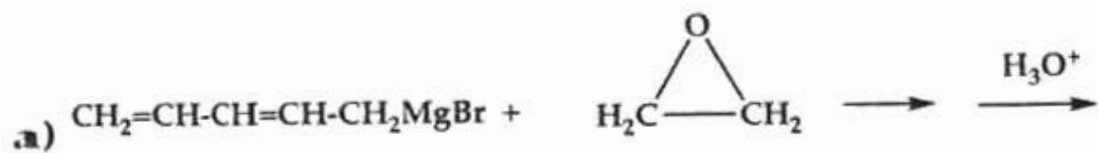
$4\pi e^- = \text{antiaromatic} = \text{very unstable}$



Doubly allylic.

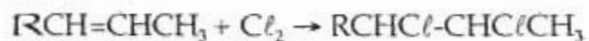
7. (10 pts) 17.37

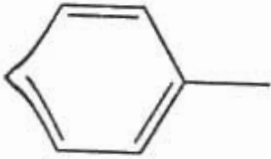
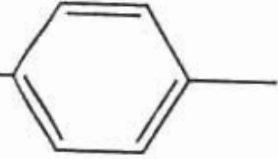
What are the reaction products?



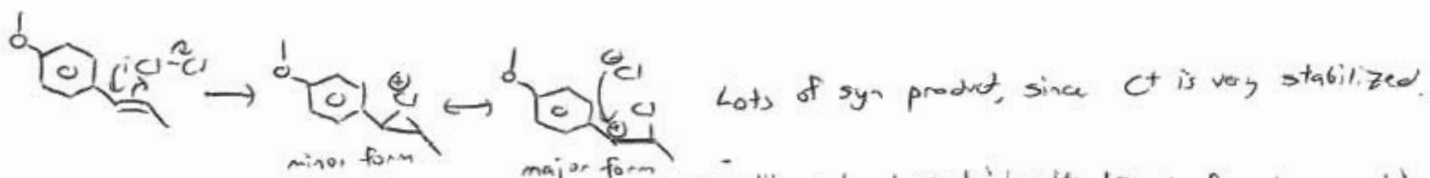
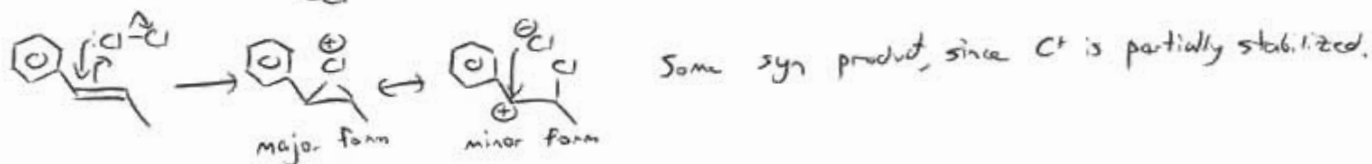
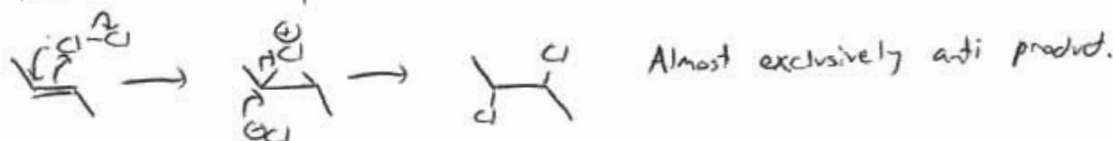
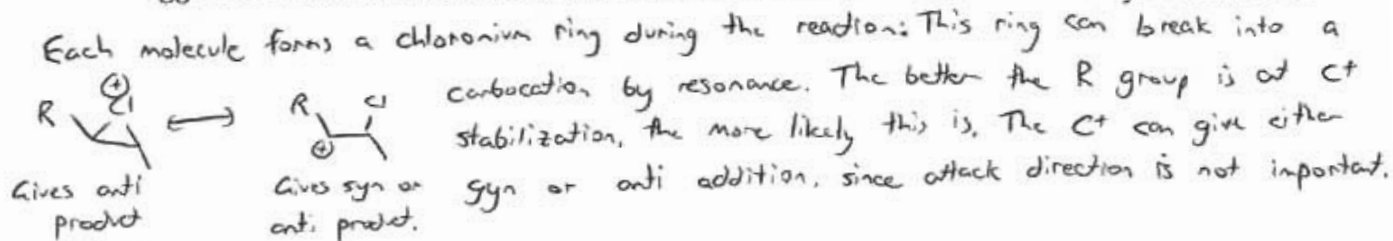
8. (10 pts) 17.45

The amount of *anti* addition in the chlorination of alkenes varies with the structure of the alkene as shown in the following table.



Structure of R	% <i>anti</i> addition
CH ₃ -	99
	88
H ₃ CO- 	63

Suggest a reason for the variation of ~~in the variation~~ of the stereochemistry of addition.



(0 pts for stereo only; 2 pts for mentioning stabilization but not explaining it; 10 pts for all correct.)