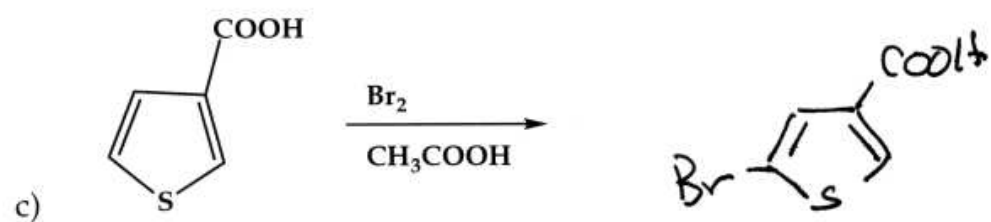
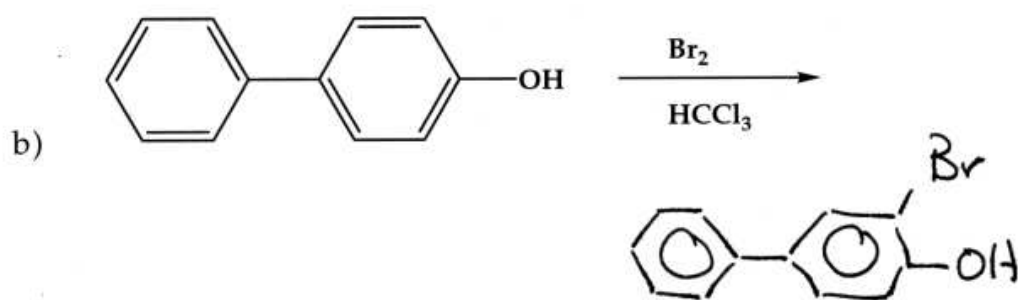
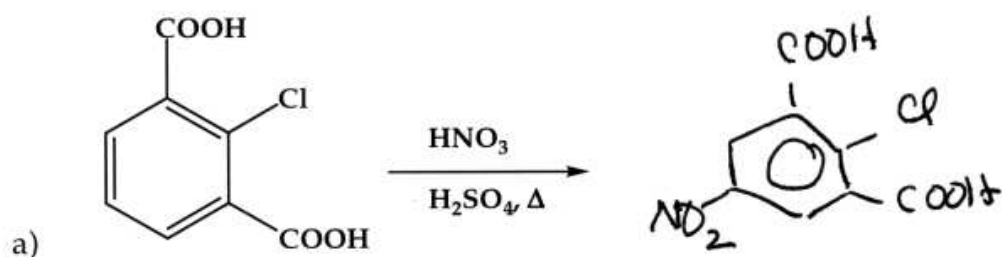


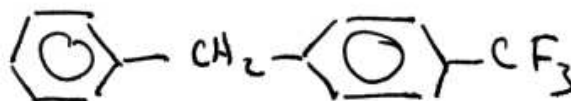
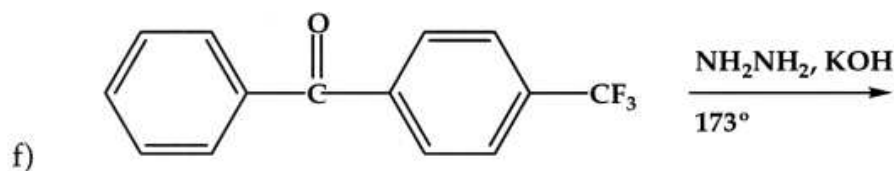
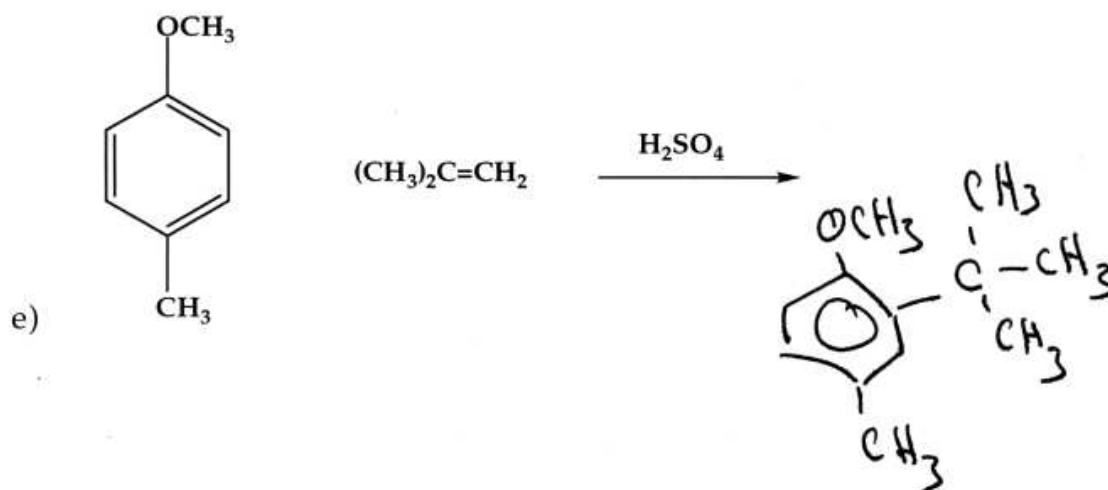
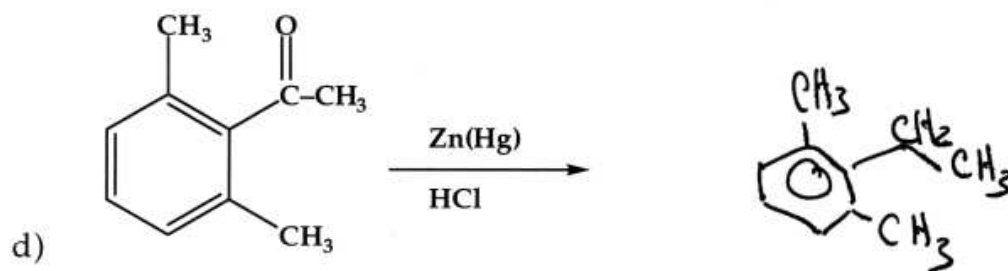
B. Ellison Spring 2002 Answer key: Final Exam

Chemistry 3311-100
Organic Chemistry/Dr. Barney Ellison
Saturday May 4th @ 10:30am → 12:30/Final Exam/MC100

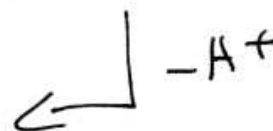
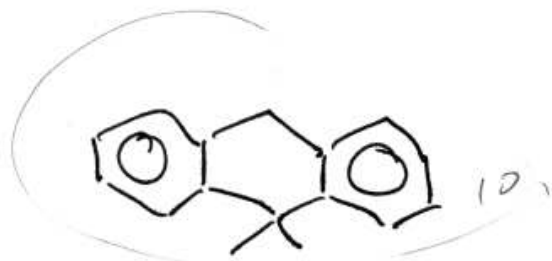
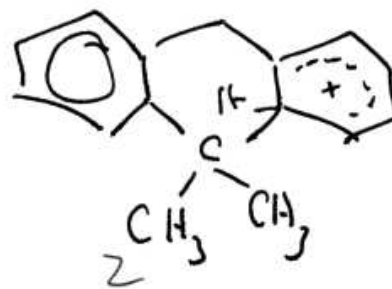
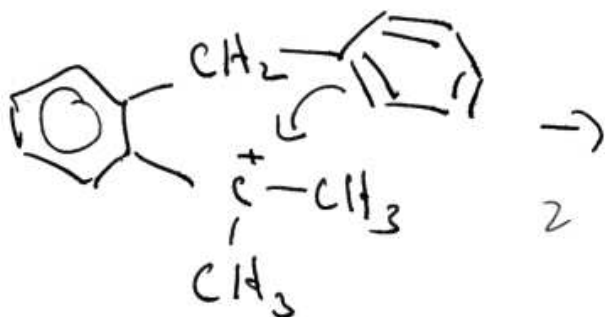
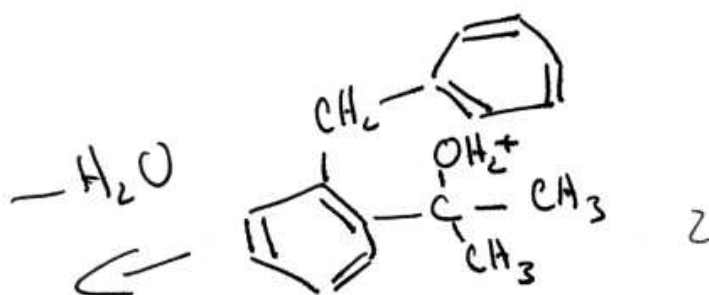
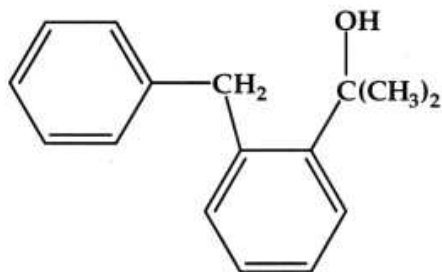
Name: Key (original) (please print)

1. (30 pts) Write the structure of the product of the reaction; only monosubstitution is involved in each case.

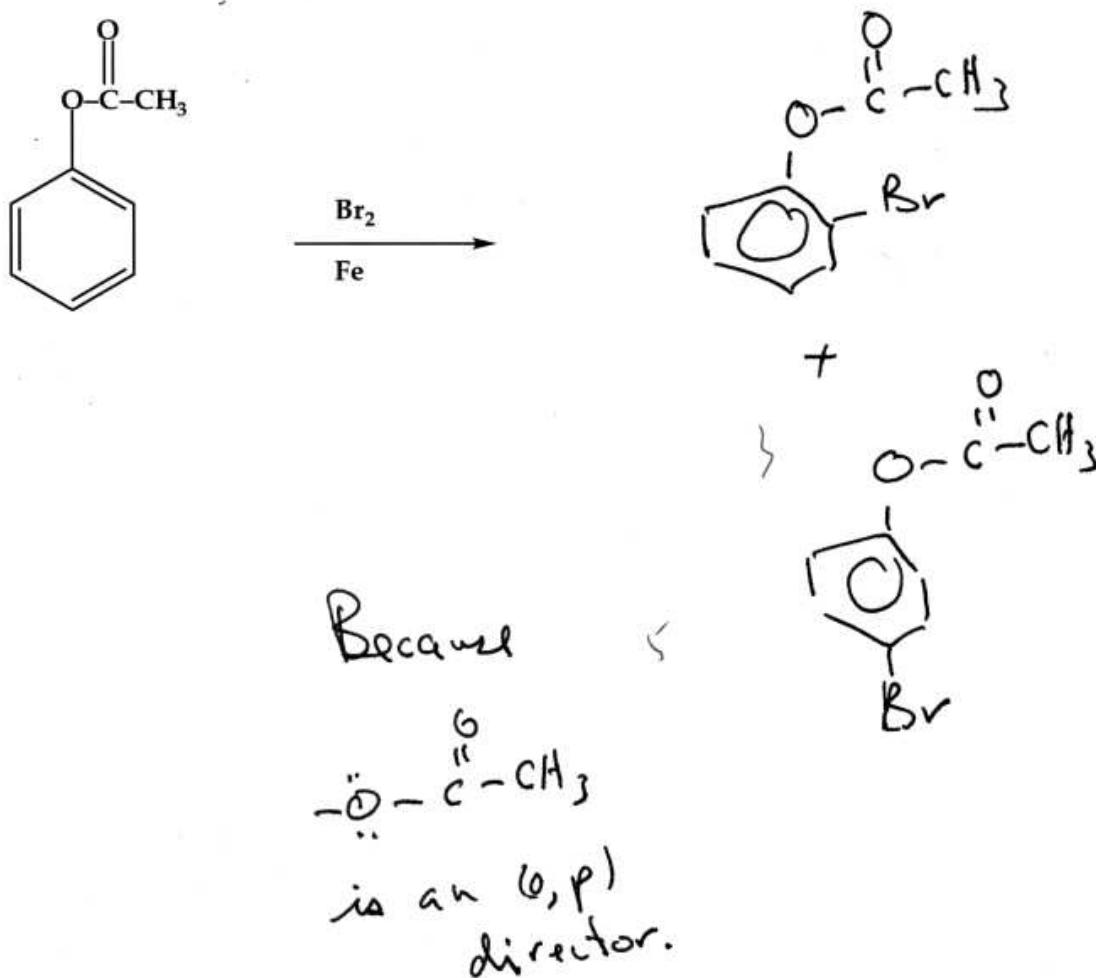
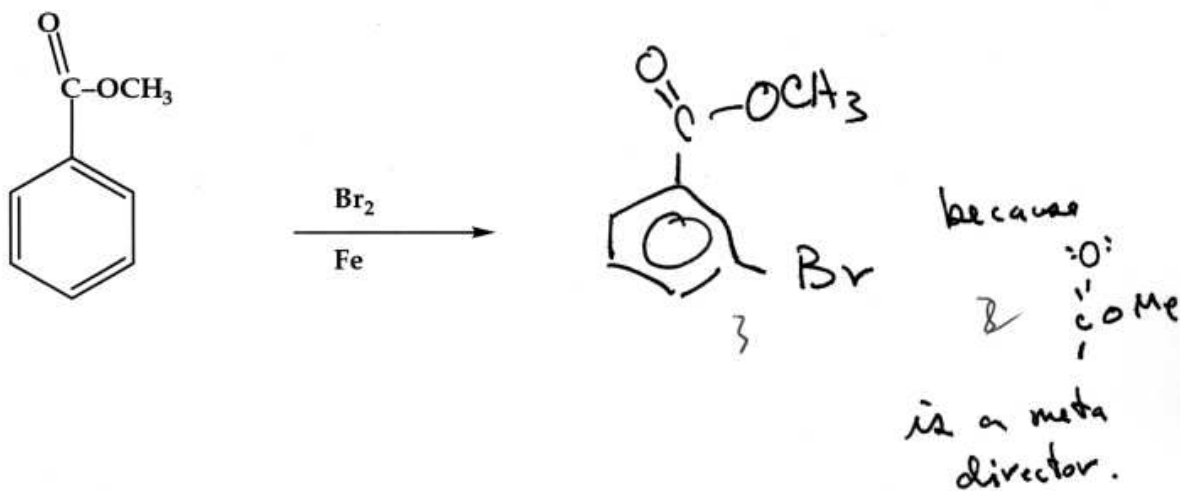




2. (10 pts) Treatment of the alcohol below with sulfuric acid gave as the major organic product a tricyclic hydrocarbon of molecular formula $C_{16}H_{16}$. Suggest a reasonable structure for this hydrocarbon.

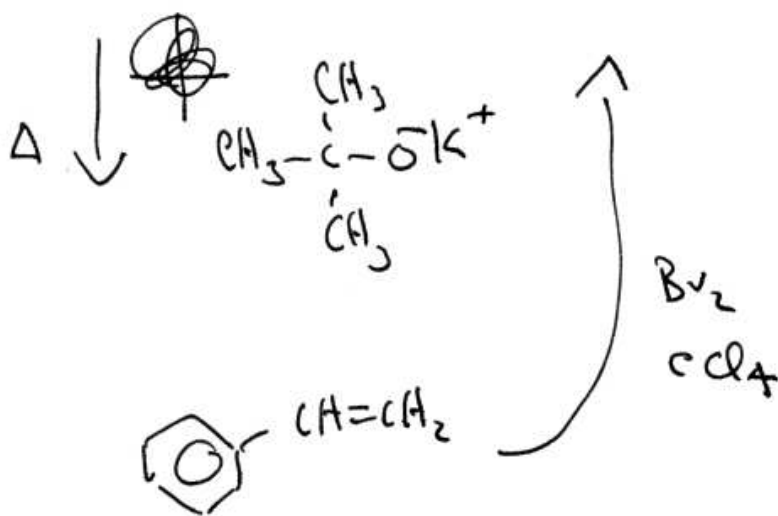
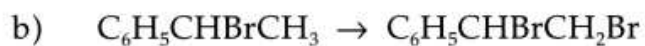
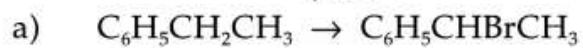


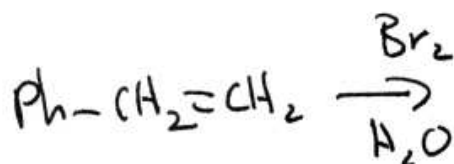
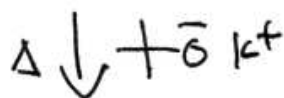
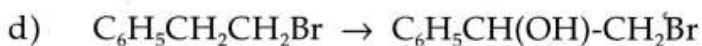
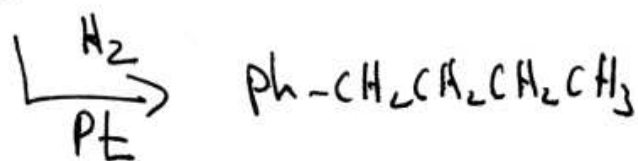
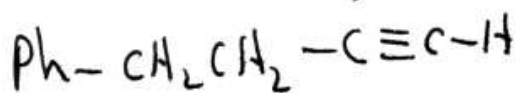
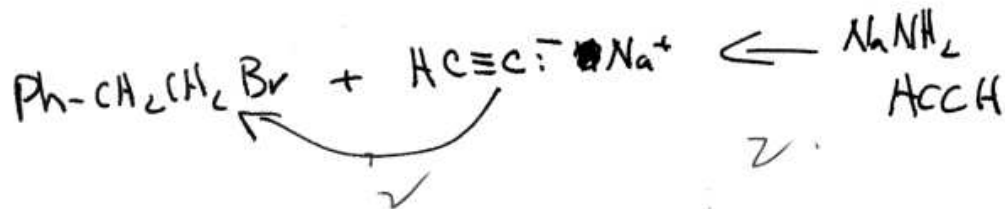
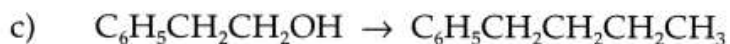
3. (10 pts) What is the product of each reaction? Why?



4. (20 pts) Suggest a synthetic route for the preparation of each of the following.

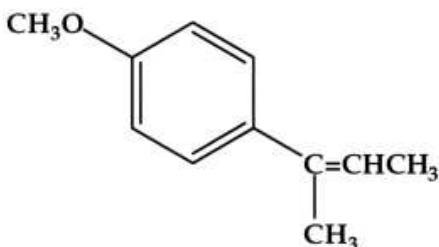
NBS



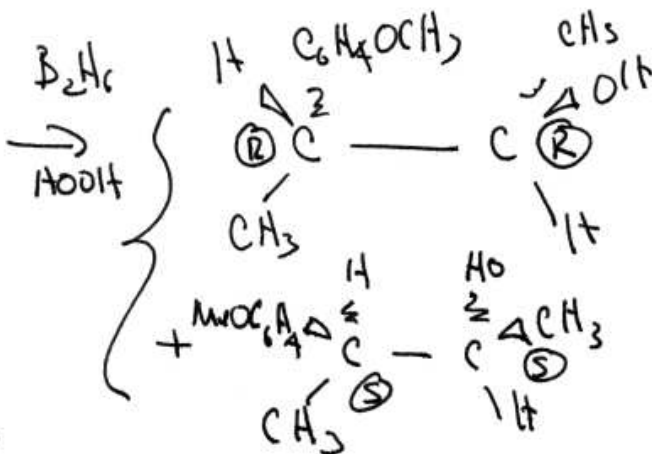
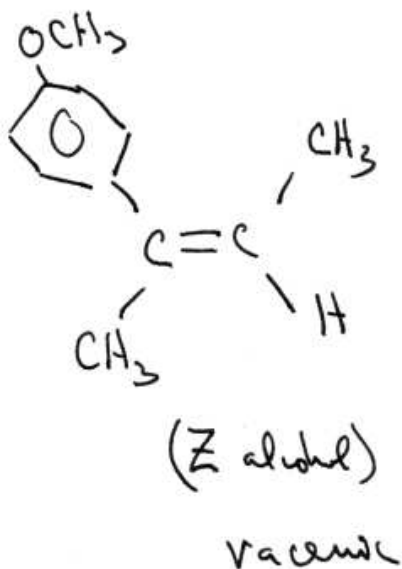
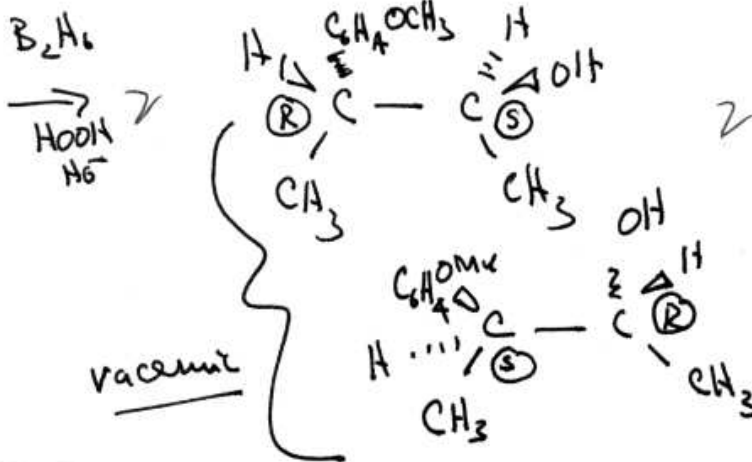
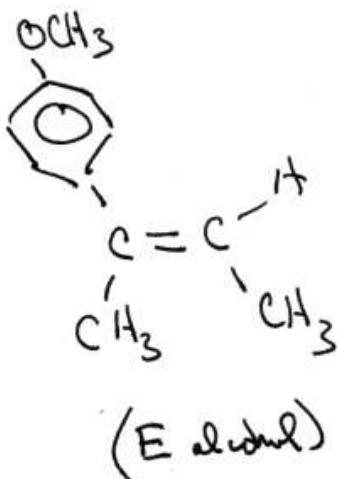


5. (10 pts) Hydroboration-oxidation of (E)-2-(p-anisyl)-2-butene yielded an alcohol A, mp 60°, in 72% yield. When the same reaction was performed on the Z alkene, an isomeric liquid alcohol B was obtained in 77% yield. Suggest reasonable structures for A and B and describe the relationship between them.

2-(p-anisyl)-2-butene



A + B are
diastereomers



6. (10 pts) Imidazole is a much stronger base than pyrrole. Predict which nitrogen is protonated when imidazole reacts with an acid and write a structural formula for the species formed. Why is pyrrole such a weak base?



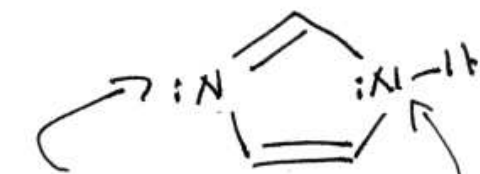
imidazole



pyrrole

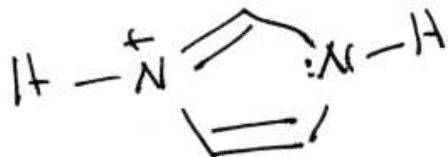
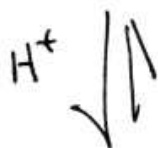
a regular amine, ok to protonate.

If the pyrrole base protonates, it is no longer aromatic

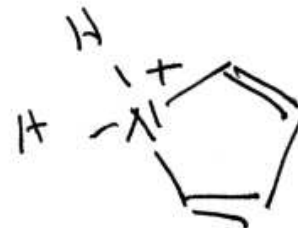
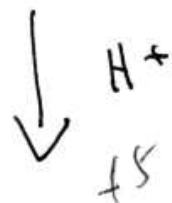
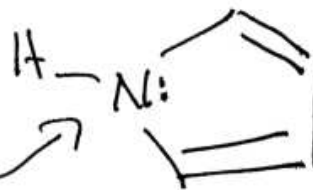


electron pair not part of aromatic sextet

electron pair part of aromatic sextet



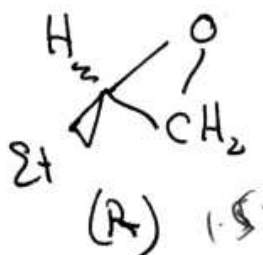
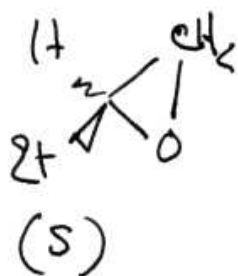
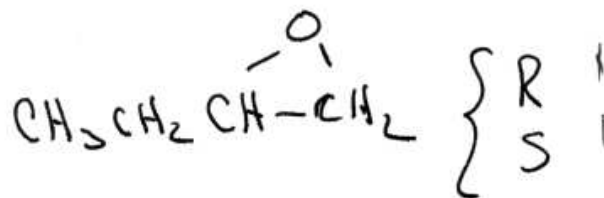
still aromatic



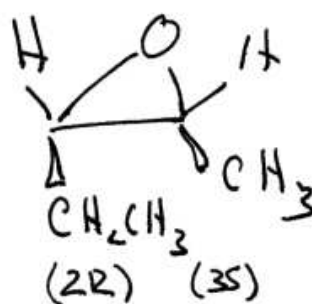
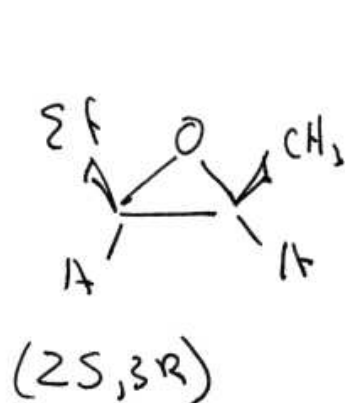
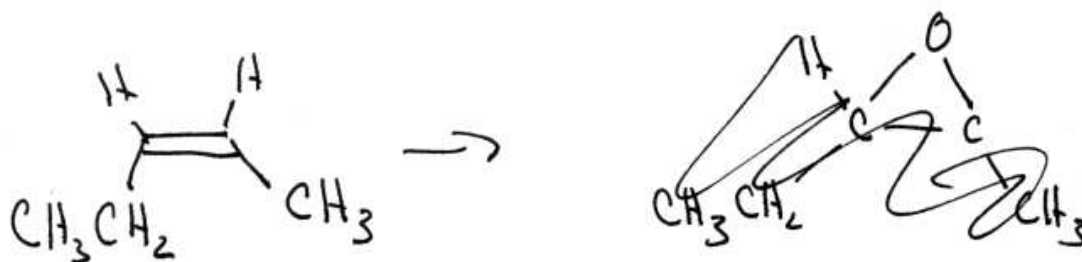
not aromatic

7. (20 pts) Write the organic products of each of the following reactions. If two stereoisomers are formed, show both. Label all stereogenic centers R or S as appropriate.

a) 1-butene + $\text{CH}_3\text{CO}_3\text{H}$ in $\text{CH}_2\text{Cl}_2 \rightarrow$

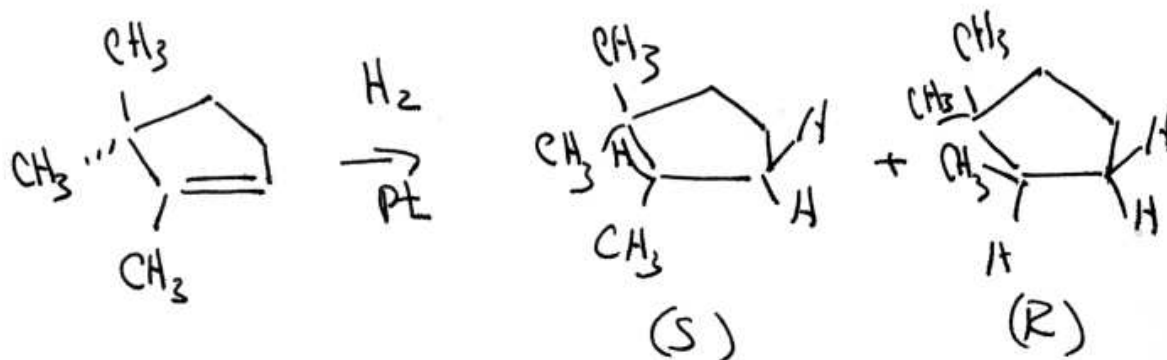


b) (Z)-2-pentene + $\text{CH}_3\text{CO}_3\text{H}$ in $\text{CH}_2\text{Cl}_2 \rightarrow$

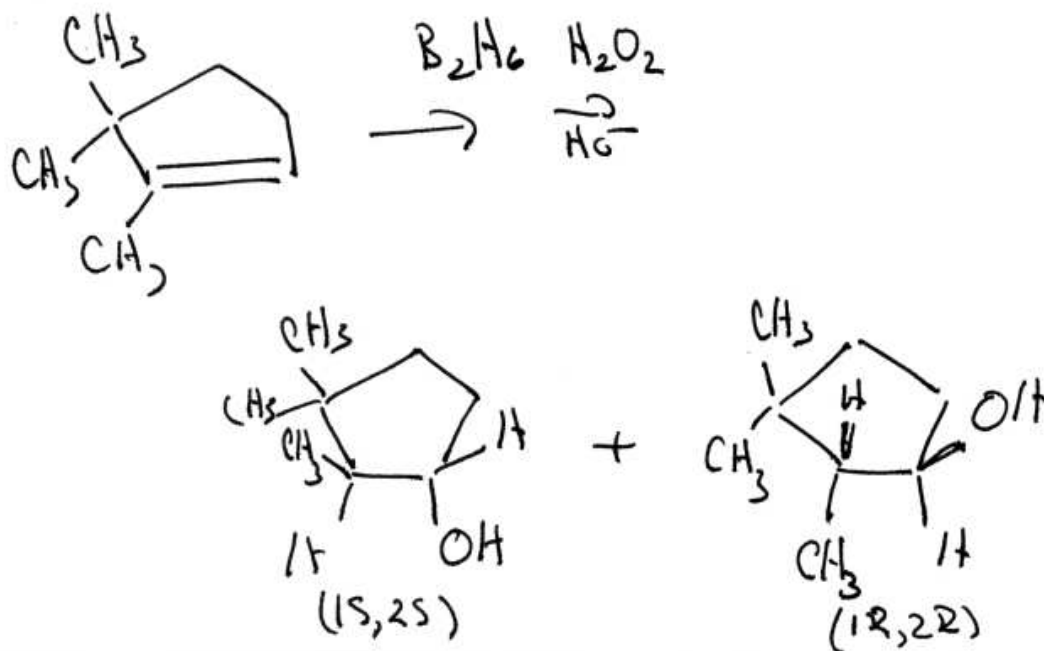


cis epoxide

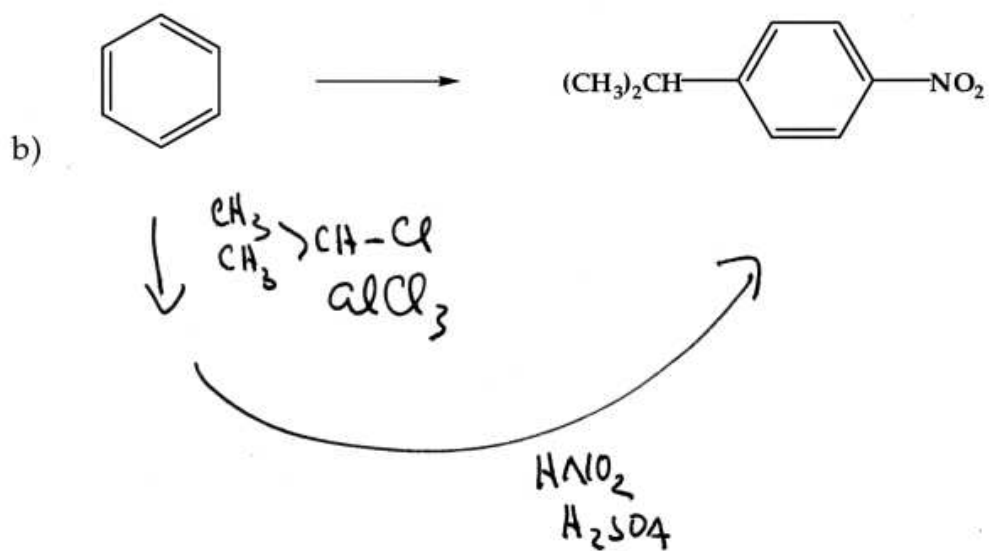
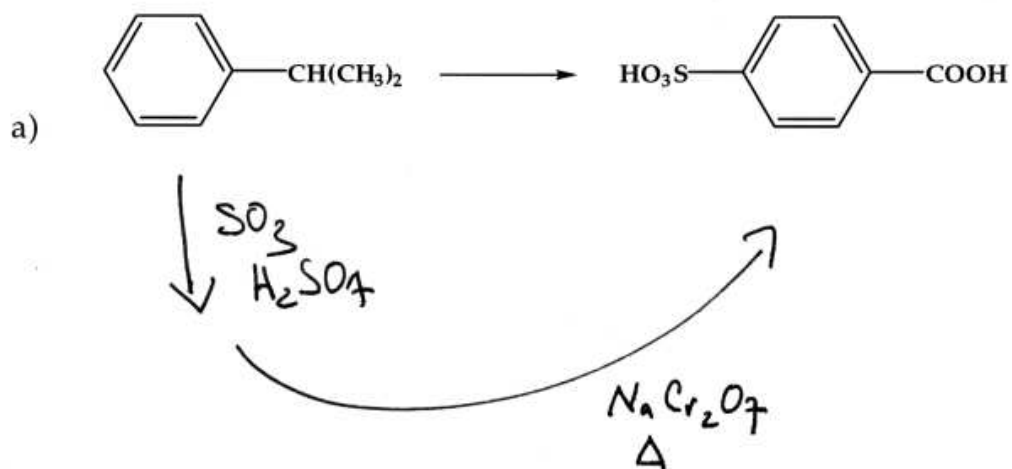
c) 1,5,5-trimethylcyclopentene + H₂ in the presence of Pt →



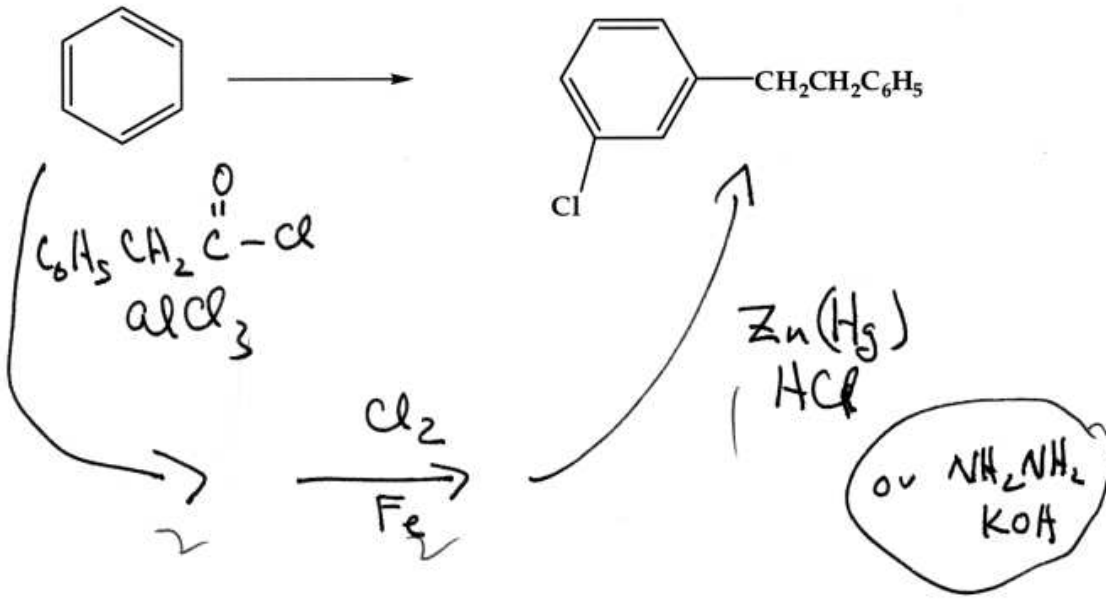
d) 1,5,5-trimethylcyclopentene + B₂H₆ in tetrahydrofuran followed by oxidation with H₂O₂ →



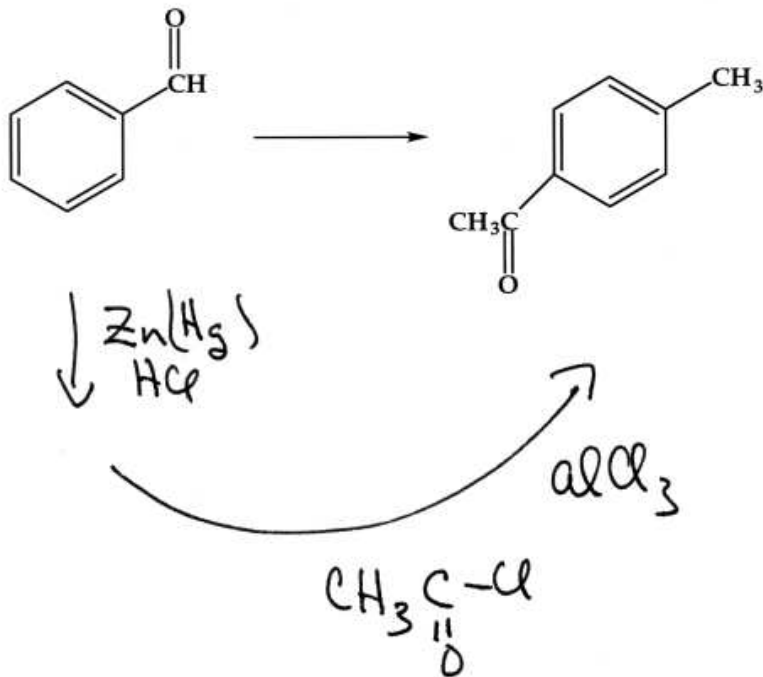
8. (20 pts) Carry out the following syntheses.



c)

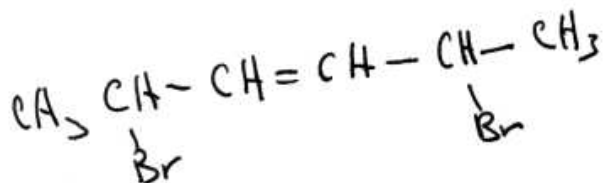
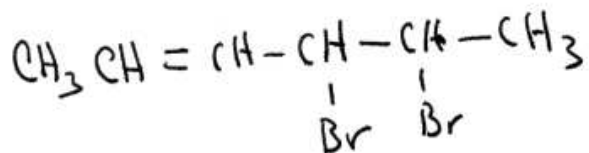


d)

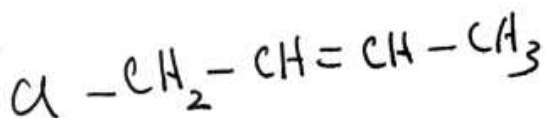
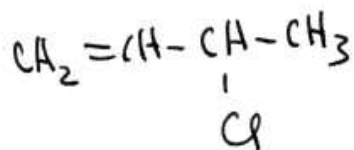


9. (20 pts) Give the chemical structure of the reactant, or product omitted from each of the following:

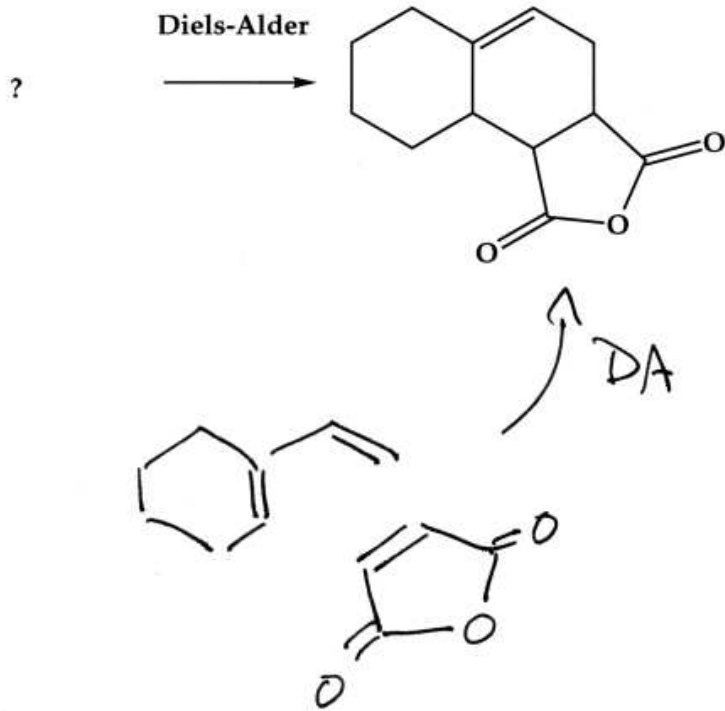
a) $\text{CH}_3\text{CH}=\text{CHCH}=\text{CHCH}_3 + \text{Br}_2 \rightarrow ?$ (two products)



b) $\text{CH}_2=\text{CHCH}=\text{CH}_2 + \text{HCl}$ (1 mole) $\rightarrow ?$ (two products)



c)



d)

