

Chem 332
Exam 4
May 24, 2006
Professor Fox

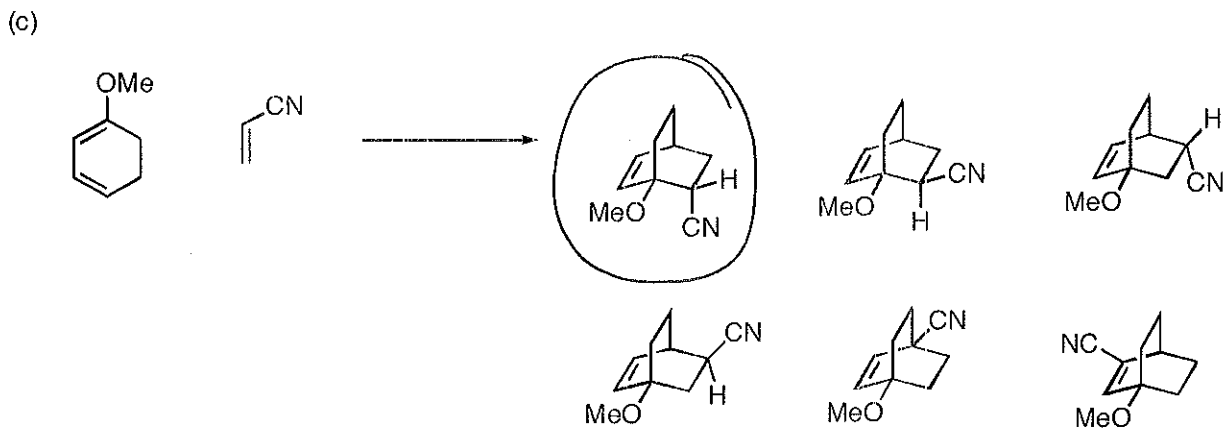
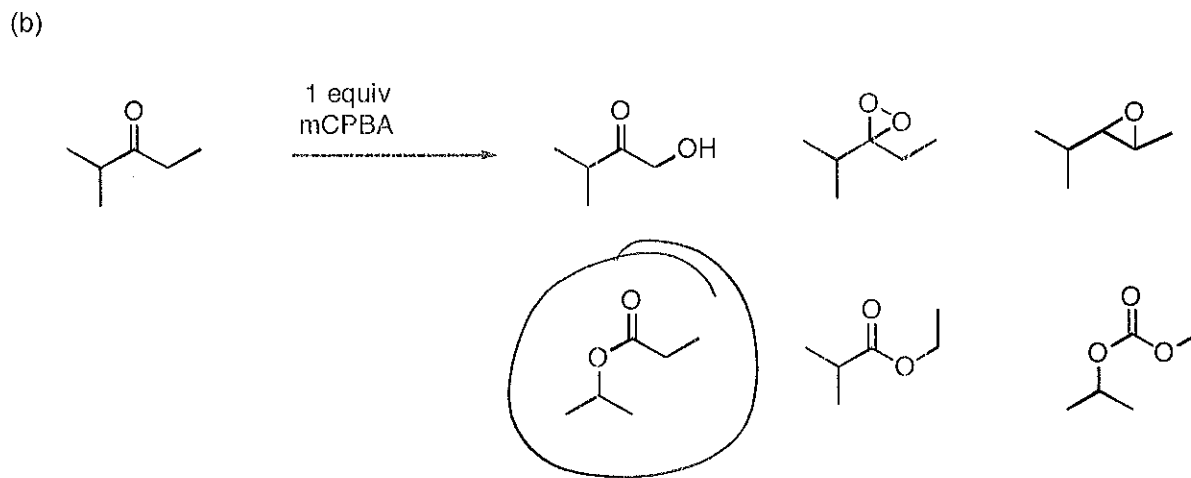
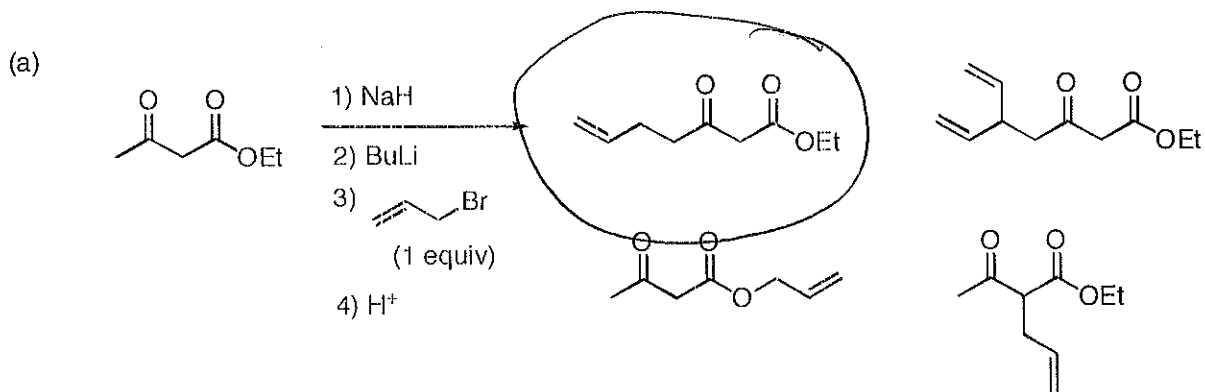
100 points
180 minutes

Your Name_____

Your Name key

1. Circle the correct product. You do not need to explain your reasoning or provide mechanisms.

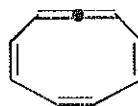
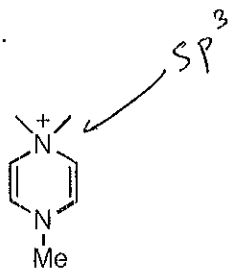
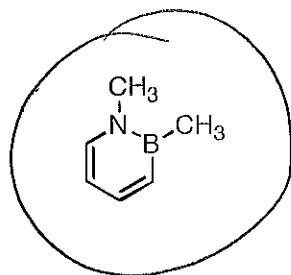
4 points each



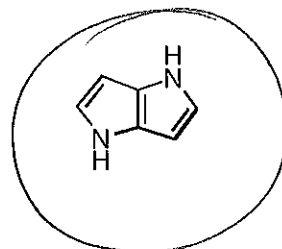
Your Name Key

2. Circle the molecules that are aromatic.

2 points each



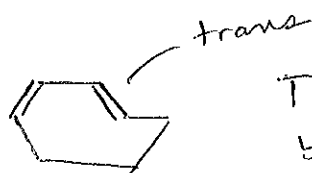
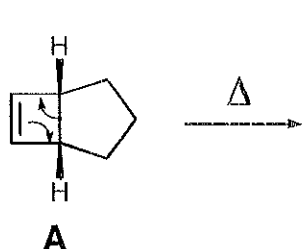
allene is
non-planar



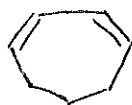
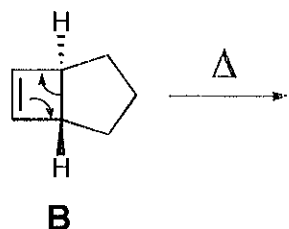
Your Name Key

3. Consider the thermal electrocyclic ring opening reactions displayed below. Which of these ring opening reactions is expected to proceed faster? Explain your reasoning using molecular orbital symmetry arguments, and draw the appropriate product in each case.

17 points



This reaction is slower because the trans-alkene is too STRAINED in a small ring.



For a 4π thermal process, the HOMO has UNLIKE symmetry

ϕ_4 —

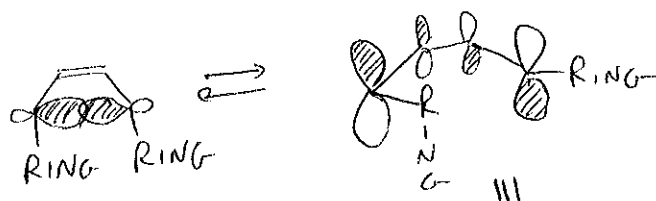
ϕ_3 —

ϕ_2 ∇ HOMO =

ϕ_1 ∇

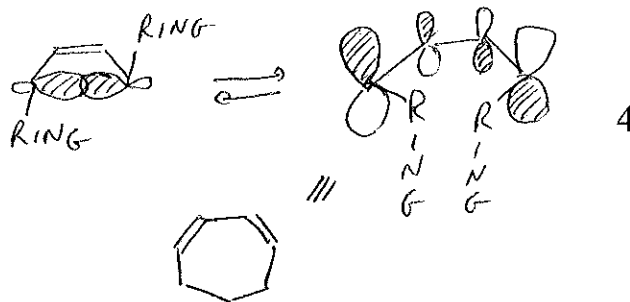
FRONTIER M.O. ANALYSIS predicts that

A is expected to lead to ~~trans~~ a cyclohexadiene with a TRANS ALKENE, which is extremely STRAINED



For B, we

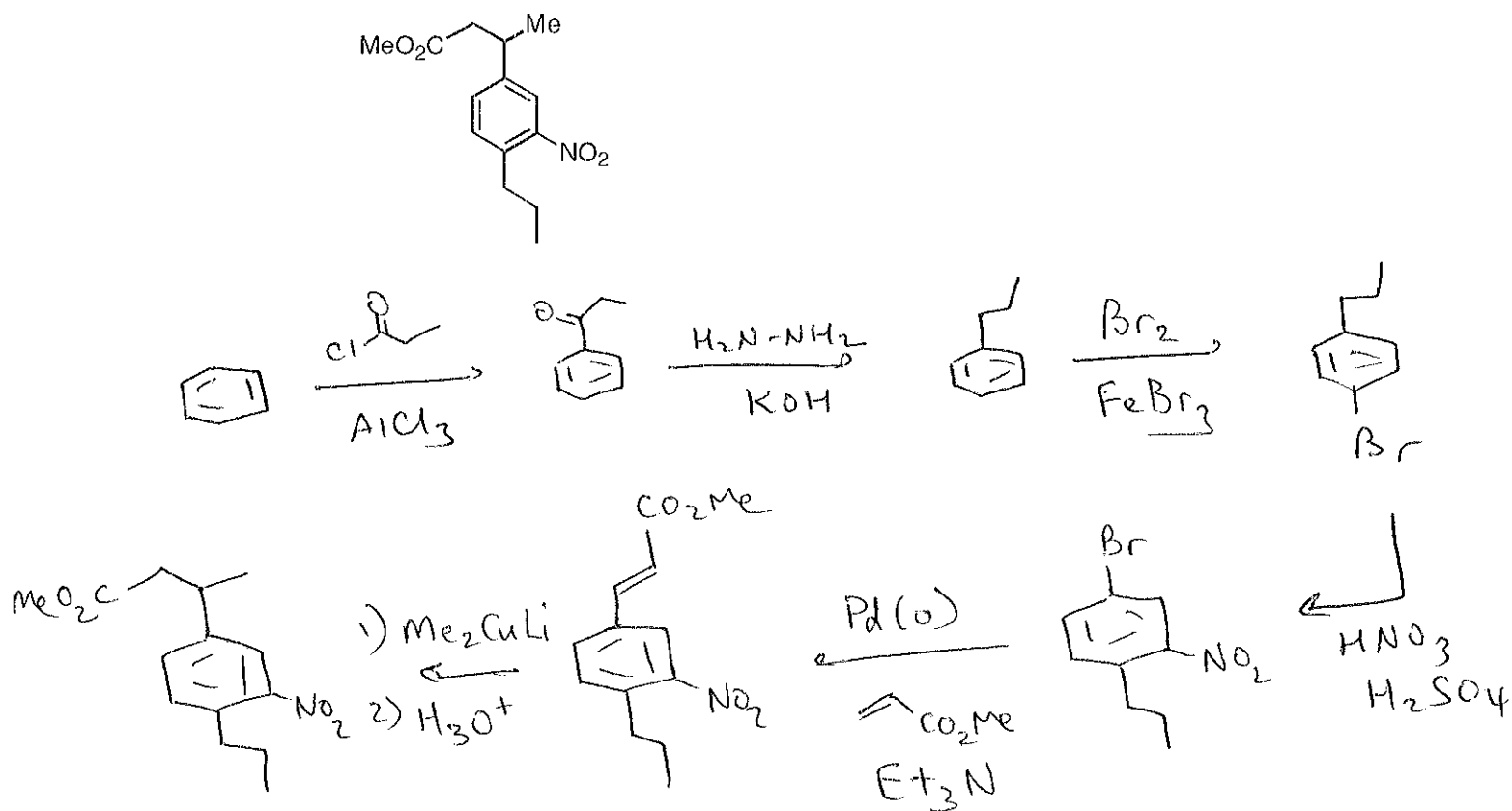
expect both ALKENES TO Be cis:



Your Name Kay

4. Provide a synthesis starting from benzene and any other materials that contain less than 4 carbons.

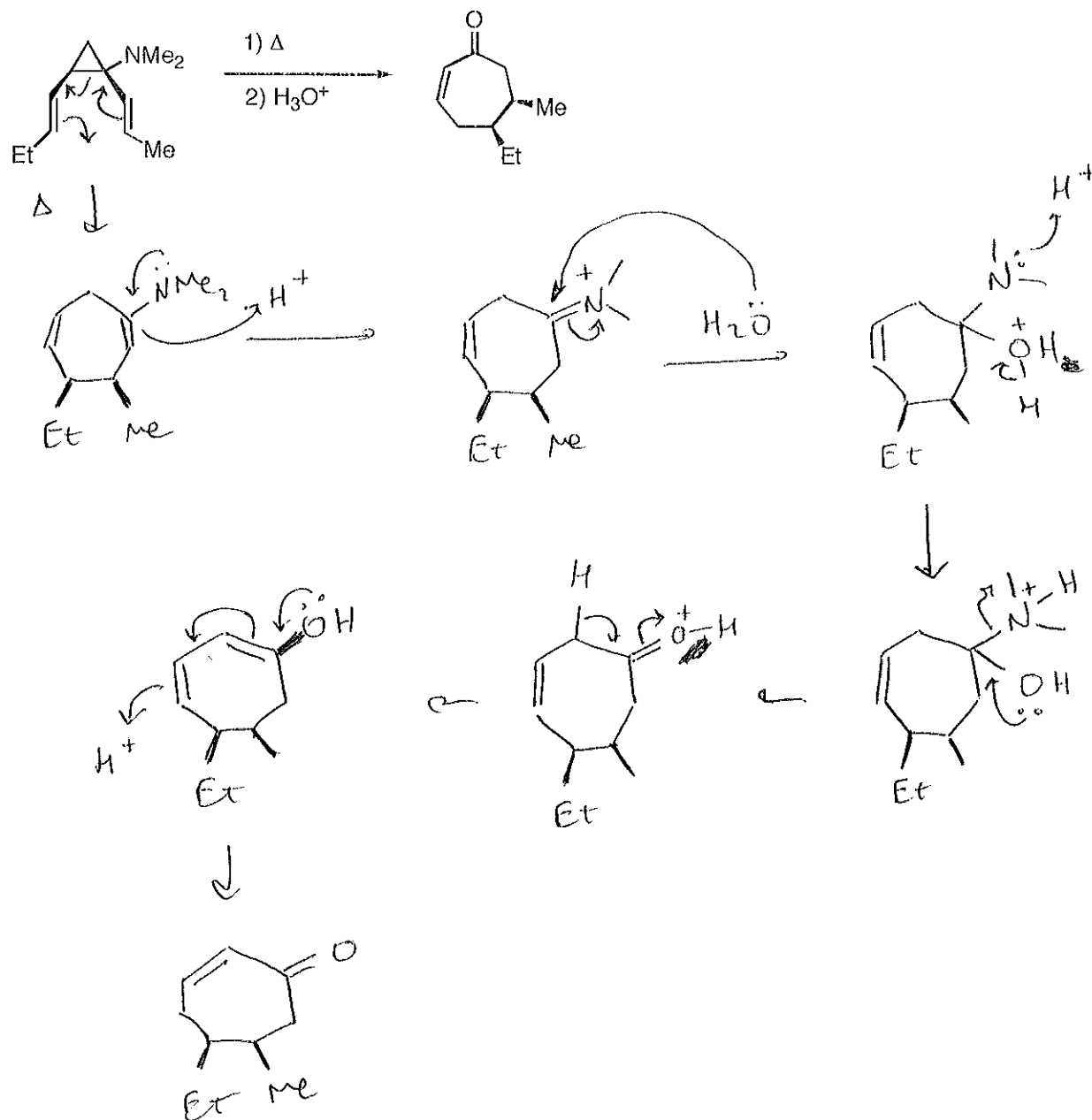
17 points



Your Name key

5. Provide a detailed arrow pushing mechanism

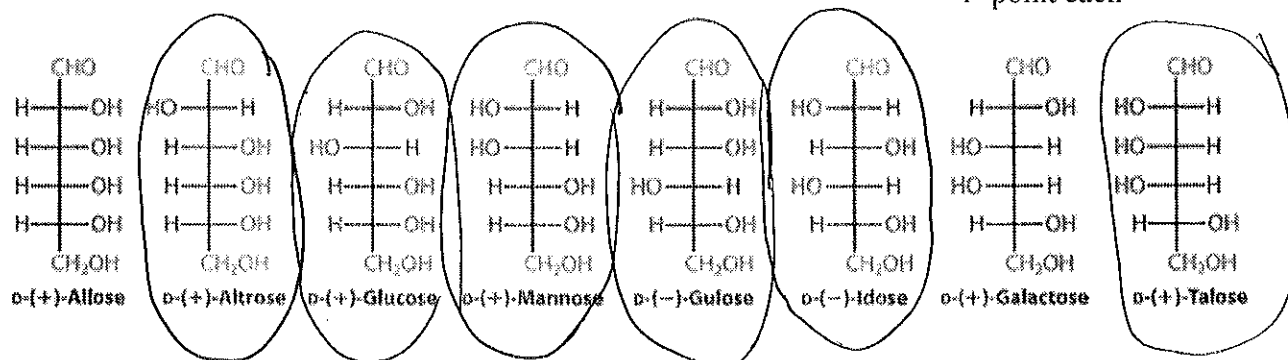
18 points



Your Name key

6. Circle those sugars that give chiral diacids upon oxidation with HNO_3

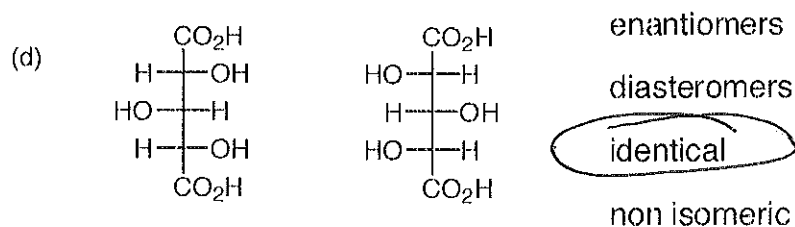
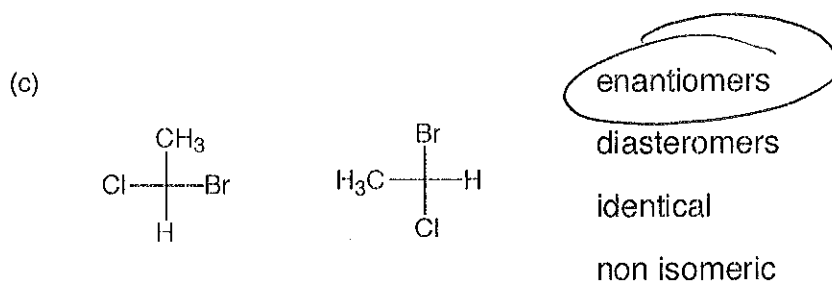
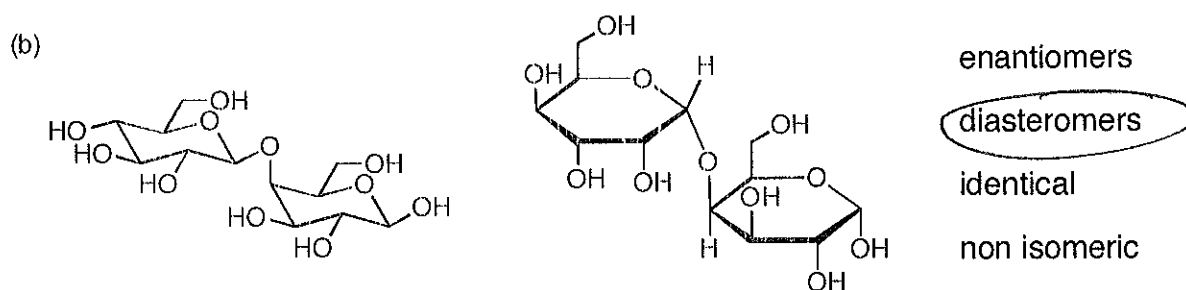
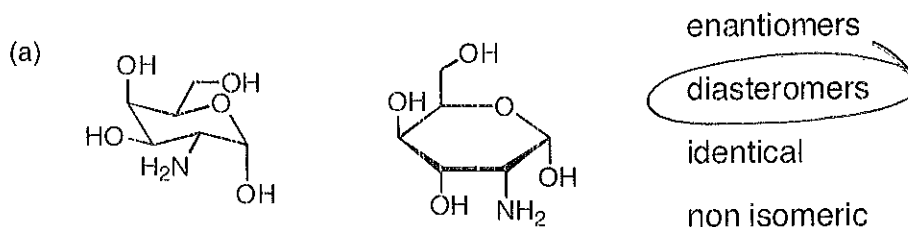
1 point each



Your Name key

3 points each

7. Identify each of the following pairs as being enantiomers, diastereomers, identical, or non-isomeric

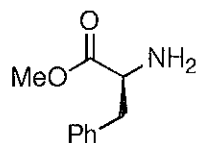


Your Name key

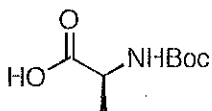
8. Indicate if each of the following reactions would proceed in high yield as shown. Provide a rationale and indicate if alternative or side products will be formed.

Note: if you anticipate that a side product will be formed, then you should circle "would not proceed as written".

(a)



+



1) DCC, pyridine
2) NaOH, H₂O
3) TFA

Phe-Ala

5 points each

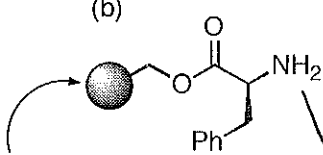
would proceed as written

would not proceed as written

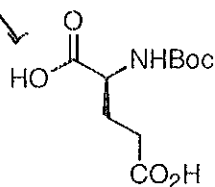
GIVES Ala-Phe.

(b)

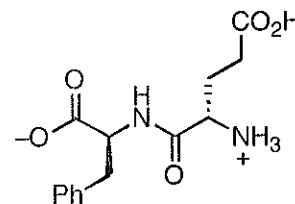
Merrifield resin



+



1) DCC, pyridine
2) TFA
3) HF



would proceed as written

would not proceed as written

DCC Coupling is NOT
selective ~~Ala-Phe~~

→ there are two acid
functions.