CHEMISTRY 3331, Spring 2004
Professor Walba
Third Hour Exam, April 15

scores:

1) 20

2) 20

3) 24

4) 15

5) 21

100

CU Honor Code Pledge: On my honor, as a University of Colorado at Boulder Student, I have neither given nor received unauthorized assistance.

Name (printed): Key

Signature: _____

Recitation TA Name: _____

Recitation day and time: _____

This is a closed-book exam. The use of notes, models, calculators, and other paraphernalia will not be allowed during the exam. Please put all your answers on the test. Use the backs of the pages for scratch.

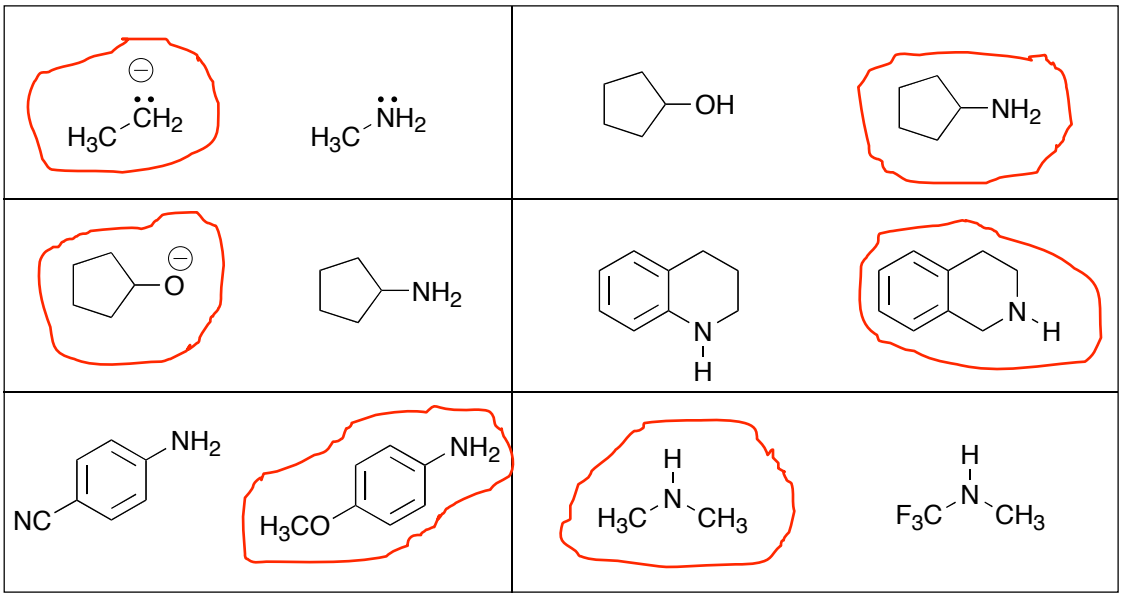
PLEASE read the questions carefully!

Partial Periodic Table

1A							8A
1 H	2A	3A	4A	5A	6A	7A	2 He
3 Li	4 Be	5 B	6 C	7 N	8 O	9 F	10 Ne
11 Na	12 Mg	13 Al	14 Si	15 P	16 S	17 Cl	18 Ar
						35 Br	
						53 I	

Name:_____

1 (20 pts) a) Circle the stronger Bronsted base in each of the following pairs of structures.



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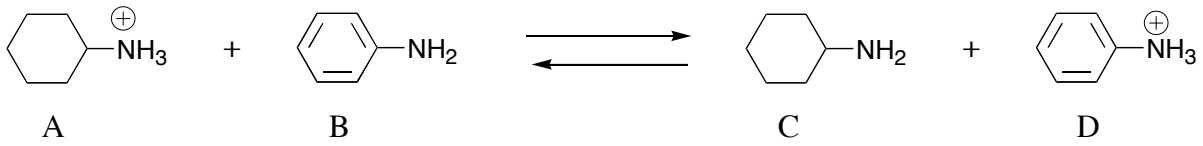
b) Referring to the following equilibrium – is the equilibrium constant K_{equ} greater than 1, or less than 1?



A B C D

Answer part b) here: K_{equ} is less than 1

c) For the reaction in part b), which is the stronger base, B or C? C

d) For your answer in part c), give a very short explanation of WHY one of these bases is stronger than the other (and not just "something is more stable than something else" – tell why it's more stable).

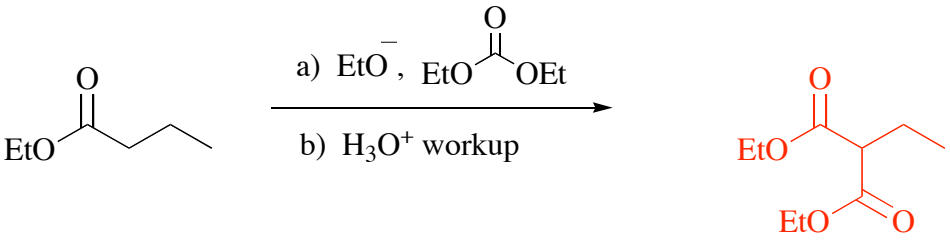
B is more stable than C due to the aniline resonance.

[In this case the relative stability of the neutral bases dominates the acidity of the cationic conjugate acids! The more stable base is the weaker base.]

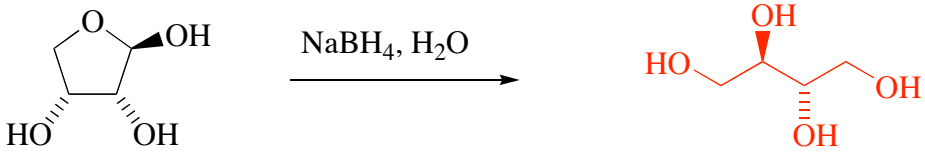
Name:_____

2) (20 pts) Give the single major organic product of each of the following reactions. Carefully indicate the stereochemistry of the product if appropriate. If a racemate is formed, show only one enantiomer and label it "rac."

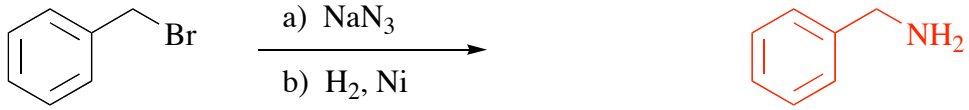
a)



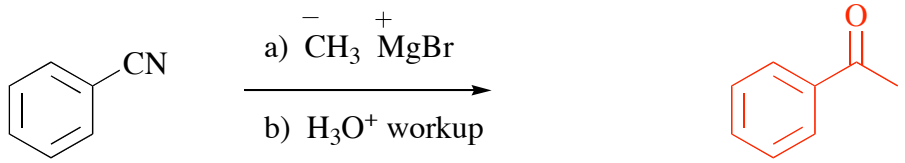
b)



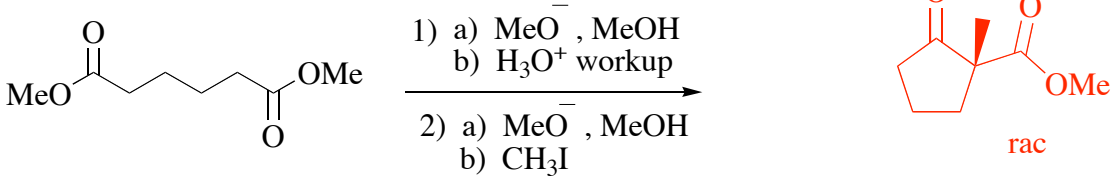
c)



d)



e)

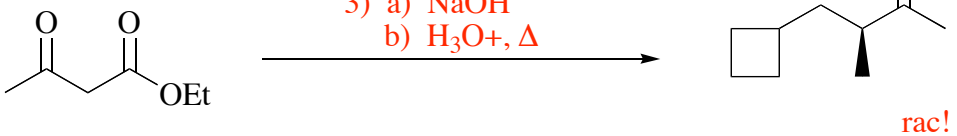


rac

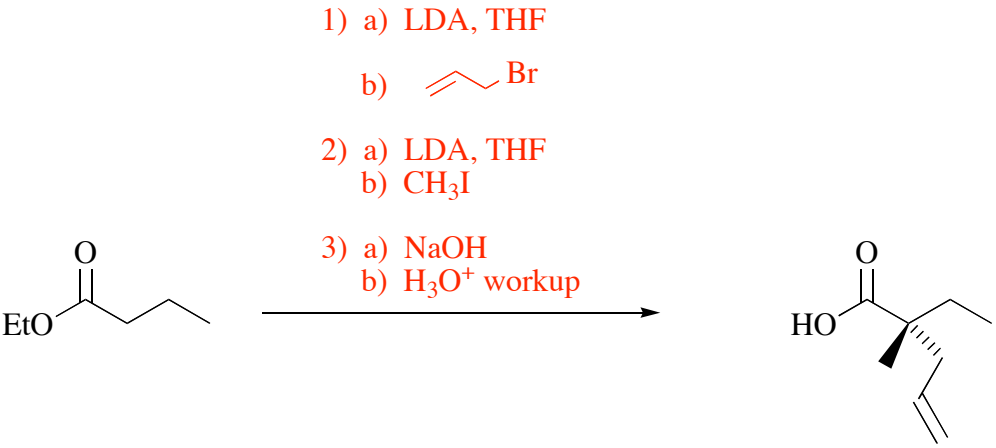
Name:_____

3) (24 pts) Propose reagents for accomplishing the following transformations. NOTE: more than one step is probably required. Try to make your synthesis efficient (i.e. the desired product should be the major product, and generally a shorter synthesis is better than a longer one). You must use the starting material given; you may use any other reagents you need.

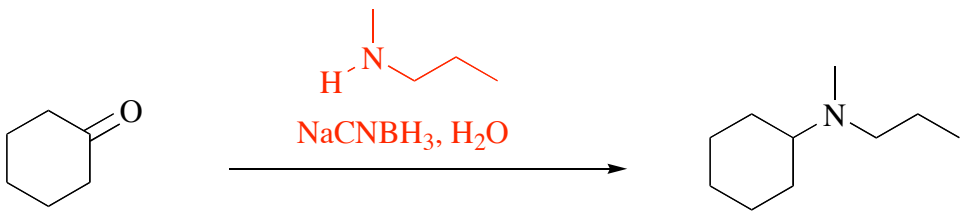
a)



b)



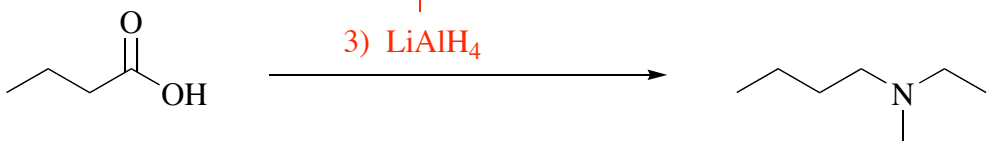
c)



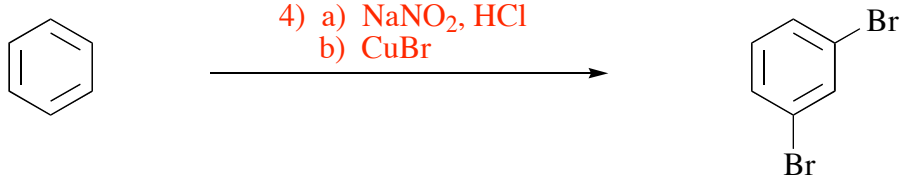
Name:_____

3) – continued

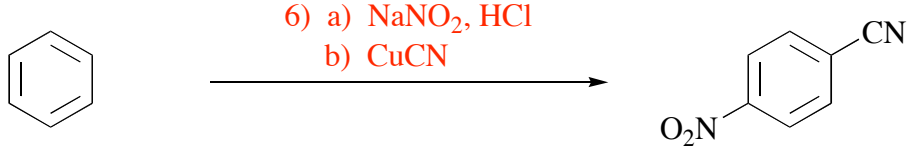
d)



e)



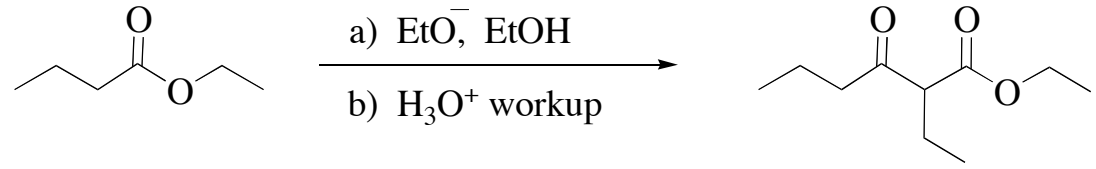
f)

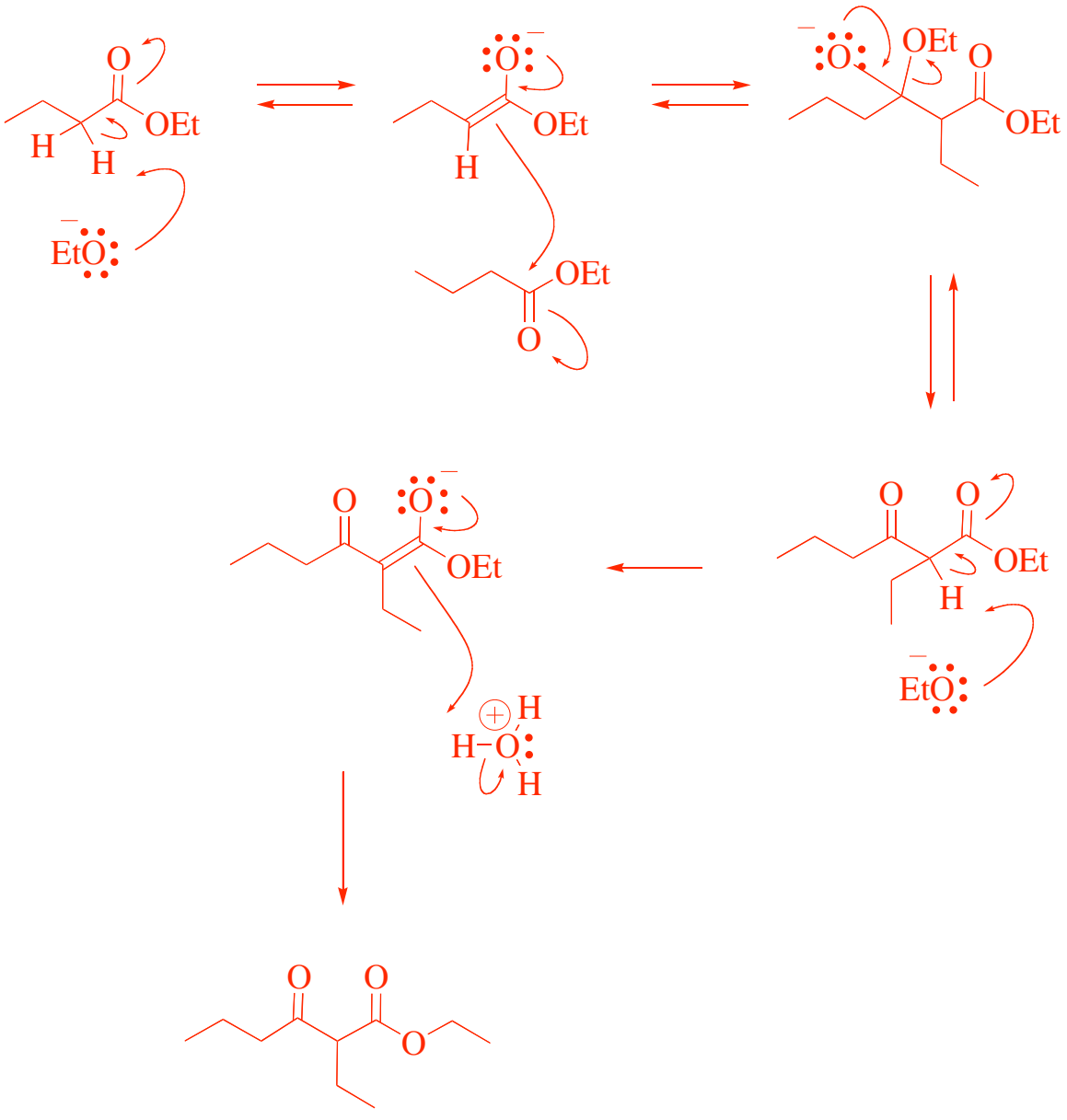


Name:_____

4) (15 pts) Propose an arrow-pushing mechanism for both of the following transformations (continued on next page).

a)

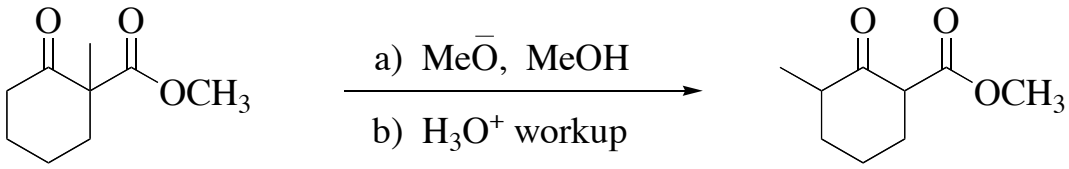


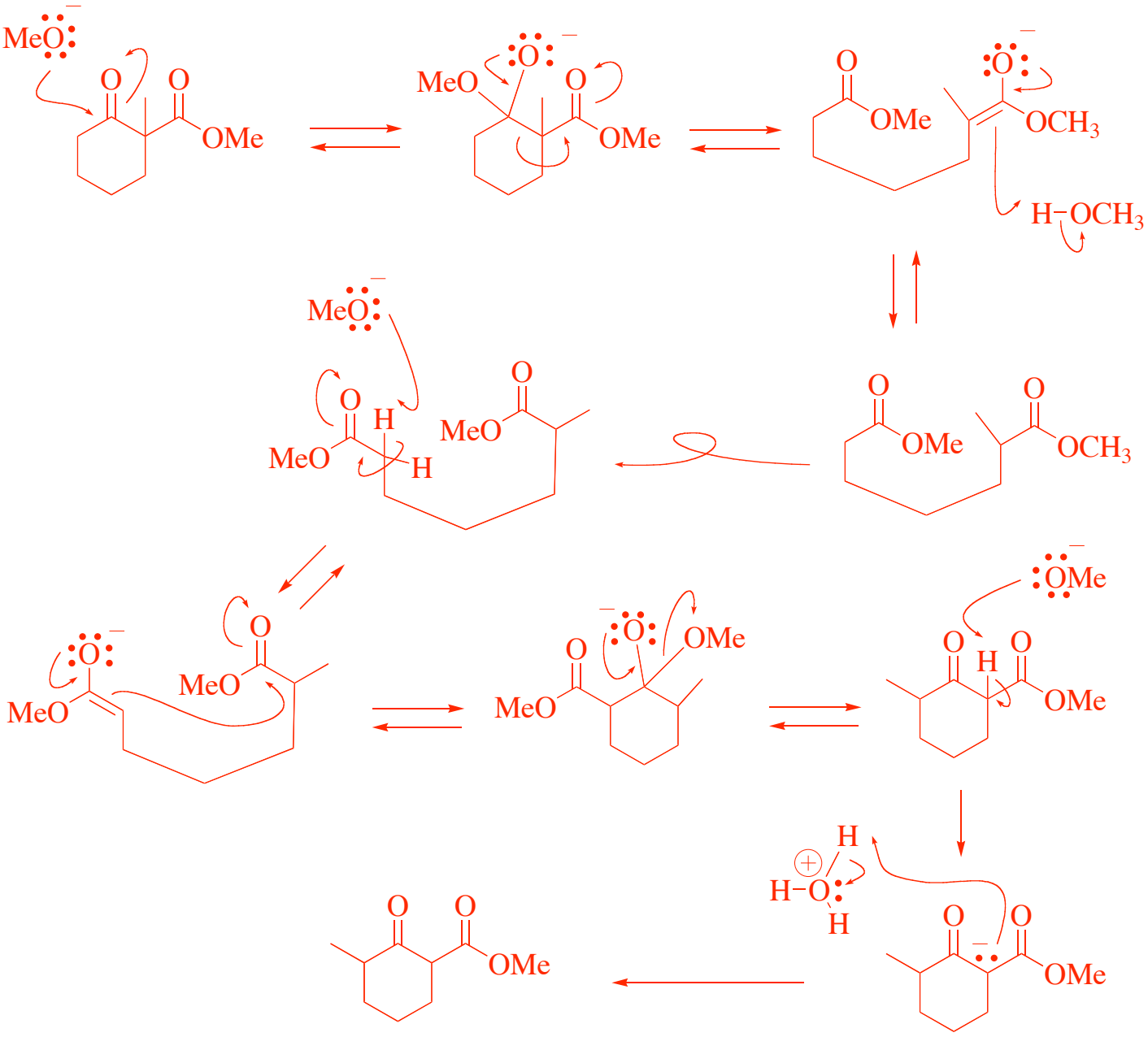


Name:_____

4) – continued

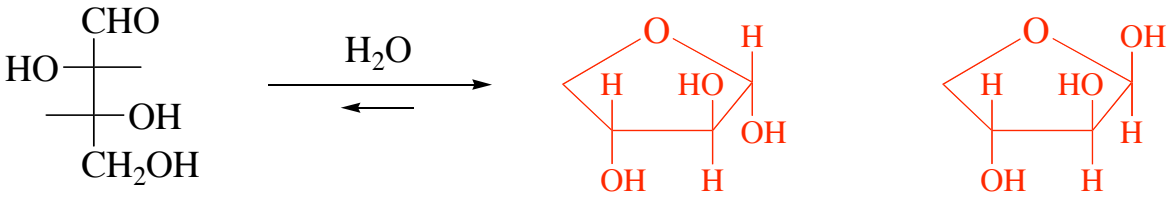
b)





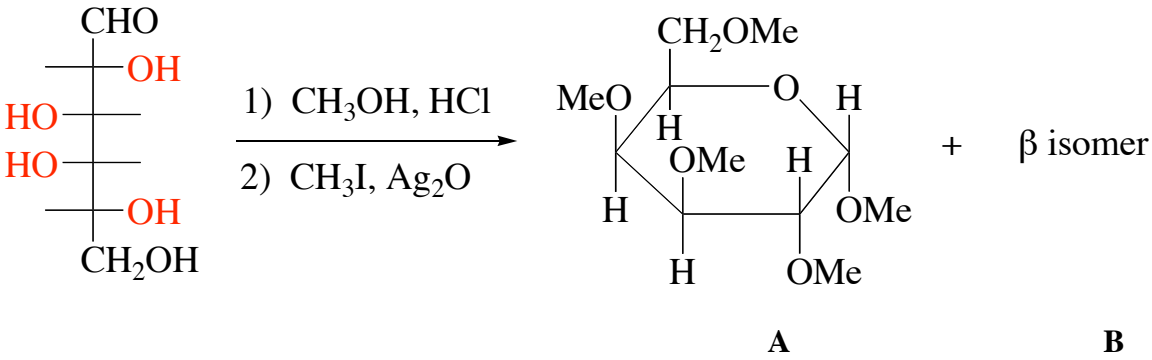
Name:_____

5) (21 pts) a) Draw a Haworth projection for each isomeric cyclic hemiacetals present in a solution of D-threose.



Fischer projection of D-threose

b) Complete the Fischer projection of the open-chain form of the aldohexose ($C_6H_{12}O_6$), which gives the α-methylglycoside **A** and the β isomer **B** in the following reaction.



A **B**

c) Draw the two perspective chair conformations (flip chairs) for compound **A** (leave out Hs), and circle the more stable conformation.