Exam #1

Chemistry 334

Organic Chemistry II

Thursday March 4, 2010

Name: KEY .

The exam is worth a total of 100 points; there are six questions. Please show all work to receive full credit for an answer.

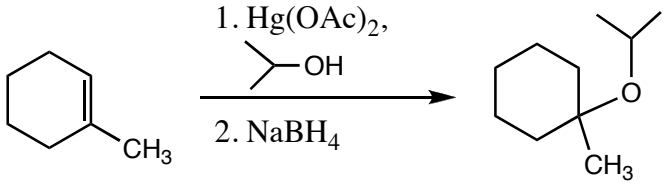
By putting your name on this exam, you agree to abide by California State University, Northridge policies of academic honesty and integrity

Molecular models are allowed for this exam. Calculators are not needed.

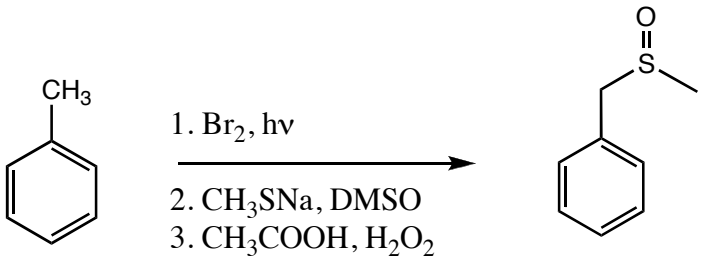
Good Luck!

1. Predict the products of the following reactions. ***Remember to indicate stereochemistry where relevant.*** (20 pts)

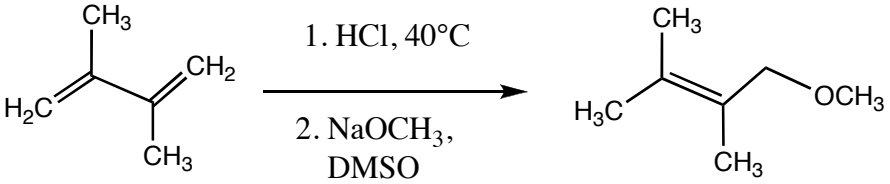
a.



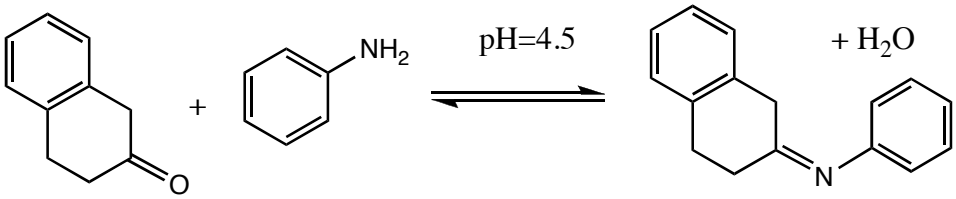
b



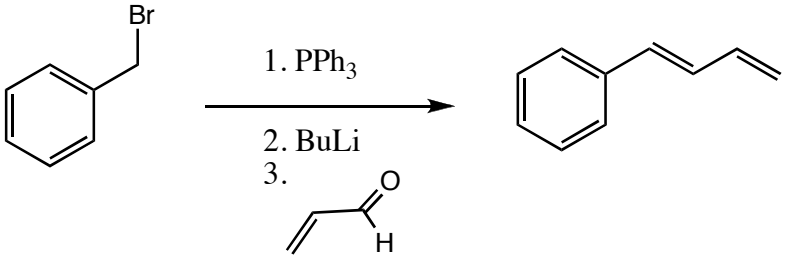
c



d.

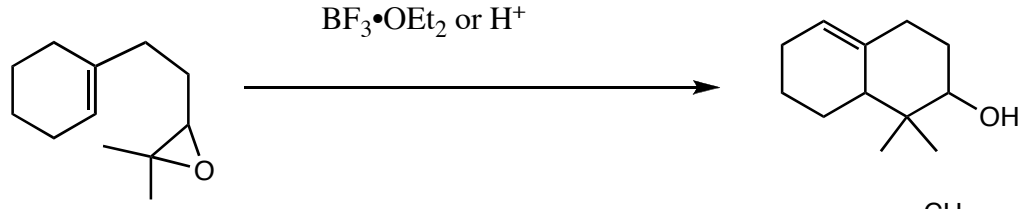


e.

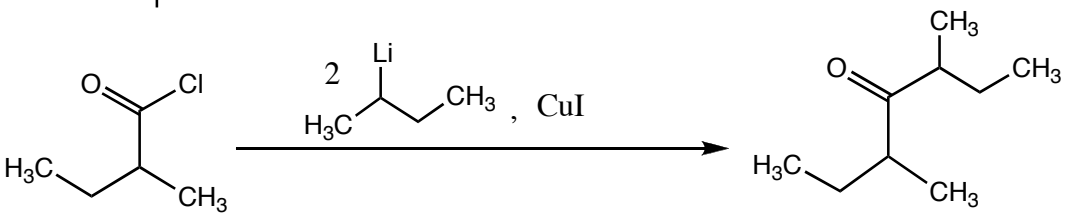


2. Indicate reagents to accomplish the following transformations. **More than one step will usually be required!!** (20 pts)

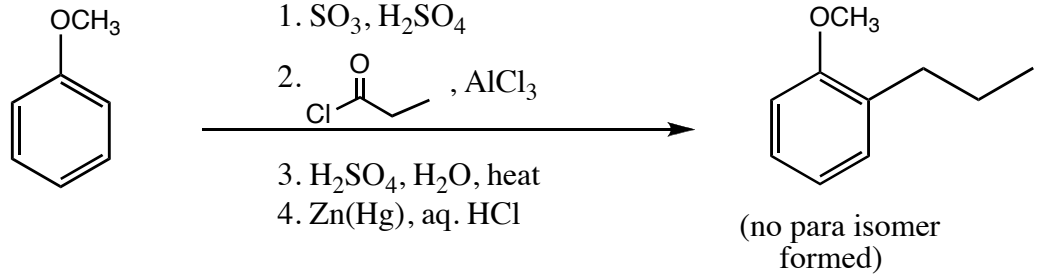
a.



b.

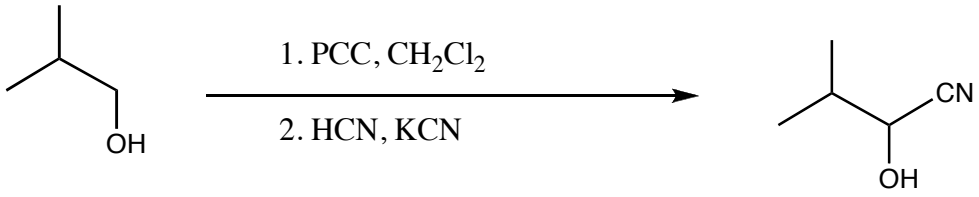


c.

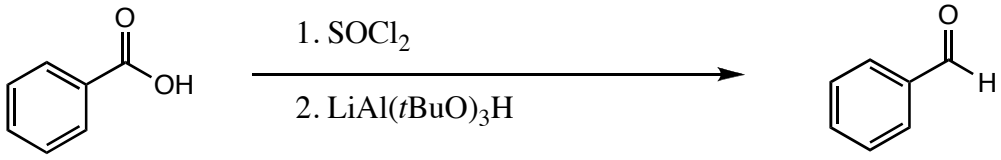


(no para isomer formed)

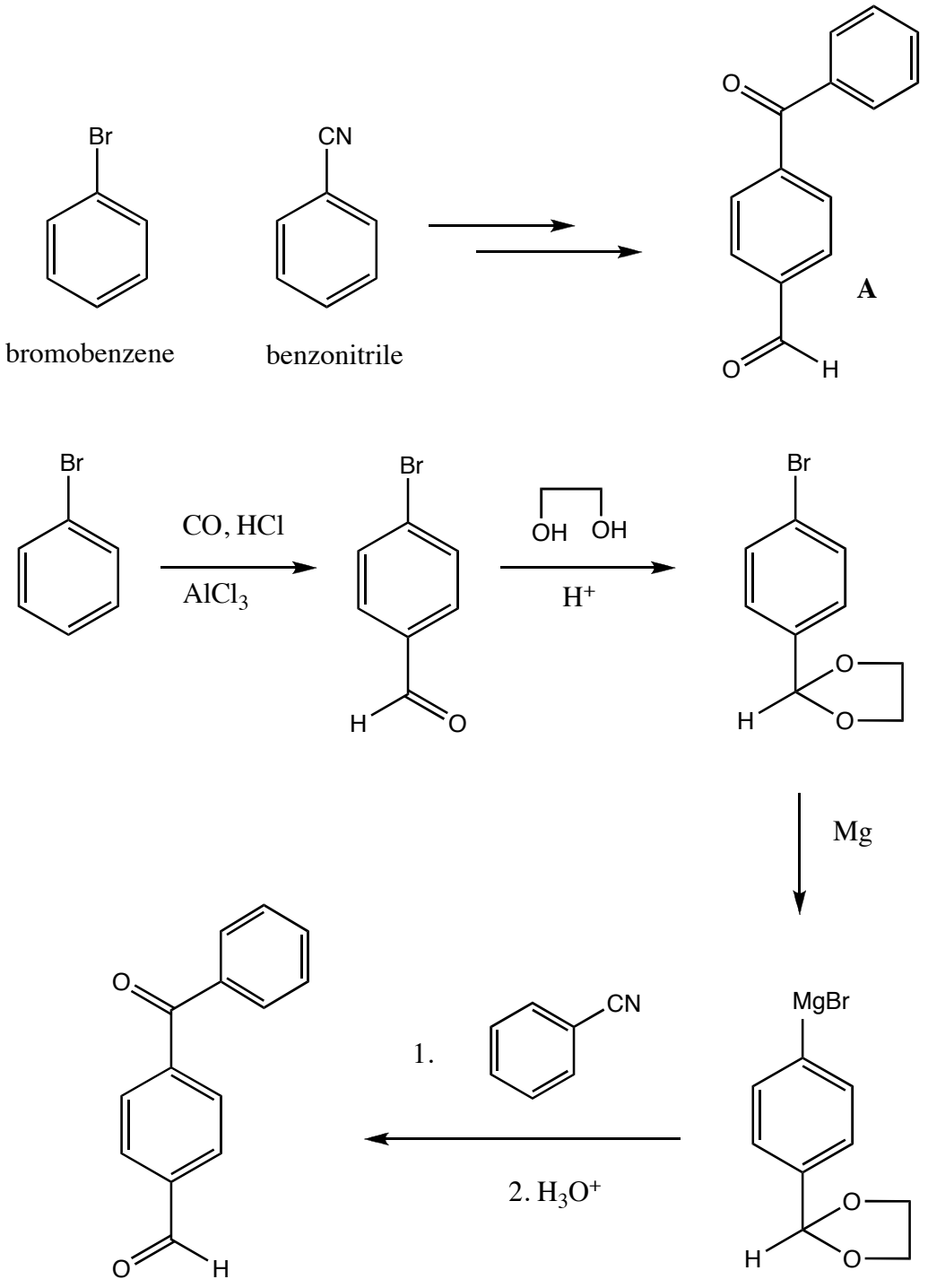
d



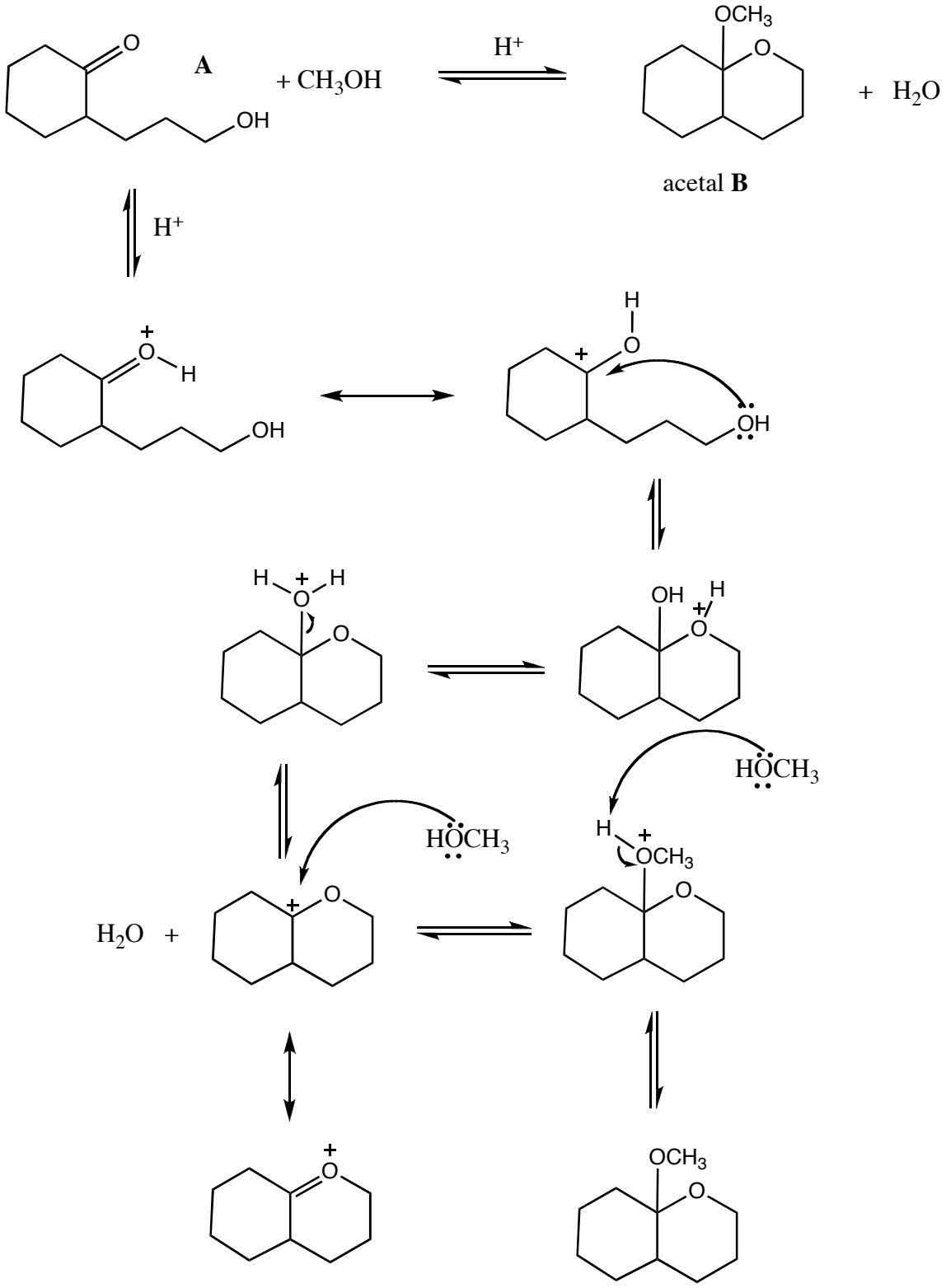
e.



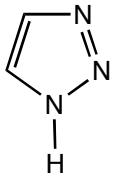
3. Design a synthesis of compound **A** from bromobenzene and benzonitrile. Useful reagents may include: $HOCH_2CH_2OH$, H^+, CO, HCl, $AlCl_3$, Mg, ether, H_3O^+ (15 pts). 5 steps will do it!



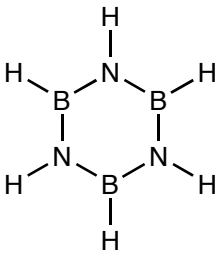
4. Draw a mechanism for the formation of acetal **B** from ketone **A** and methanol. Remember to include all intermediates, lone pairs on heteroatoms, and formal charges. (15 points)



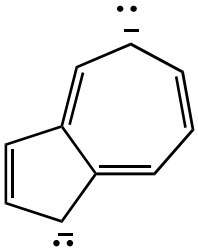
5. Identify whether each of the following compounds is **aromatic, antiaromatic, or non-aromatic**, **<u>and explain why</u>**. Be sure to draw out all lone pairs on heteroatoms! (12 points)

A 

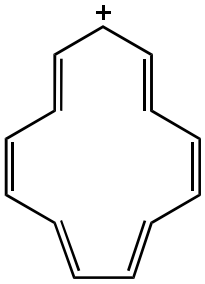
aromatic, 6 pi electrons

B 

aromatic, 6 pi electrons

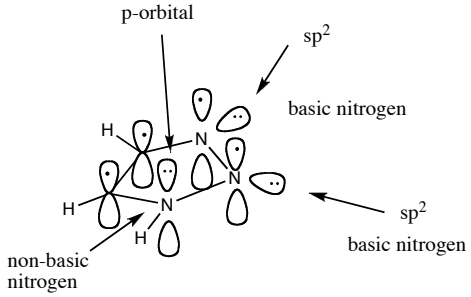
C 

antiaromatic:planar, 12 pi electrons

D 

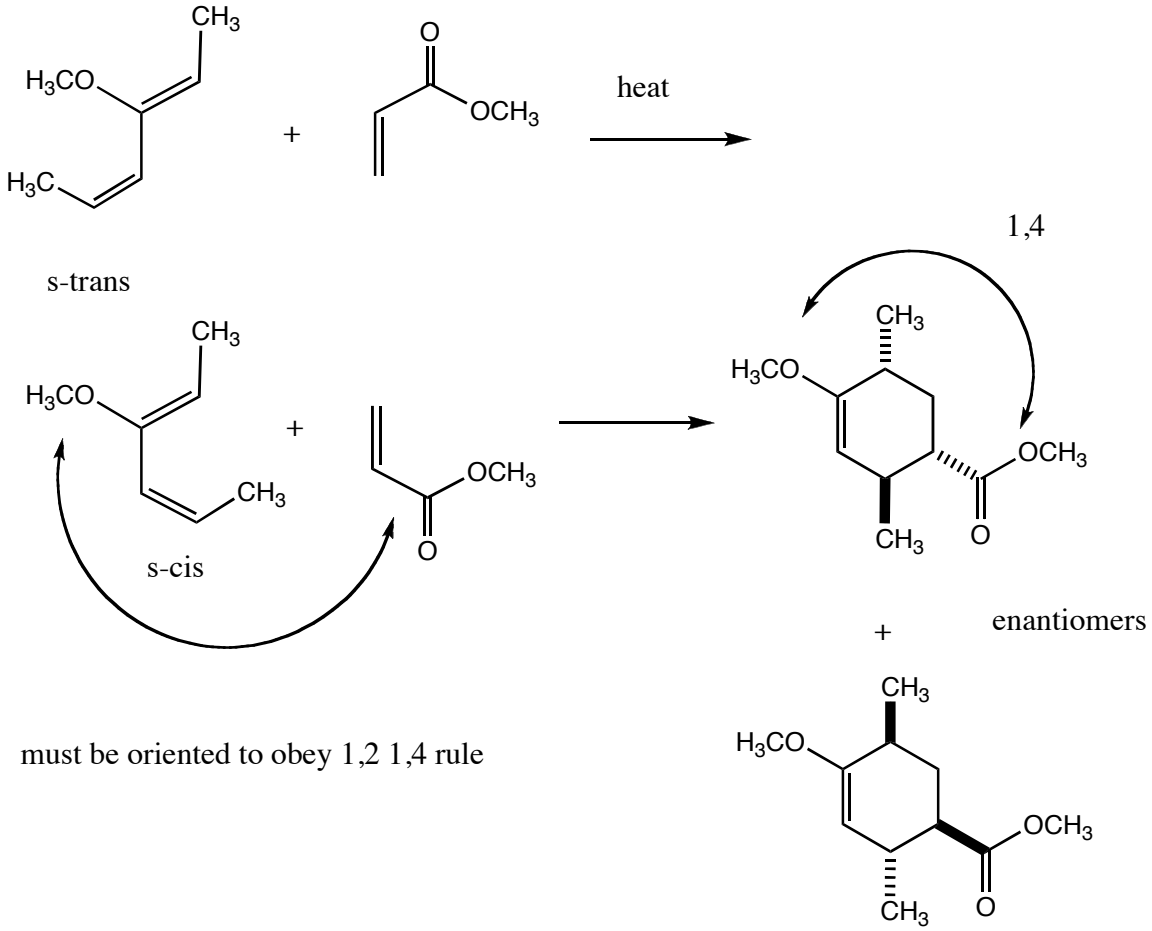
non-aromatic, non-planar

E Draw out the orbital structure of the compound in **A** above, showing explicitly the overlapping p orbitals of the pi system and any orbitals bearing lone pairs. ***Which nitrogen(s) in the structure are expected to be basic?*** (8 points)



6 pi electrons-aromatic

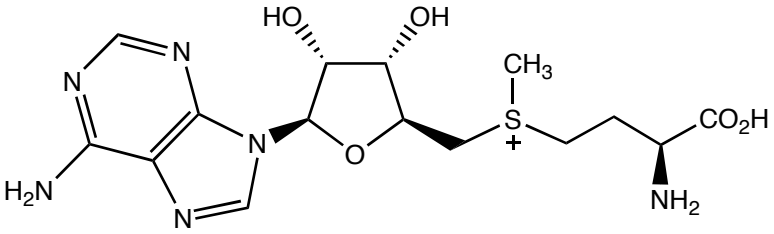
6. Draw the product(s) of the following reaction, *being sure to note stereochemistry explicitly*. (10 points)



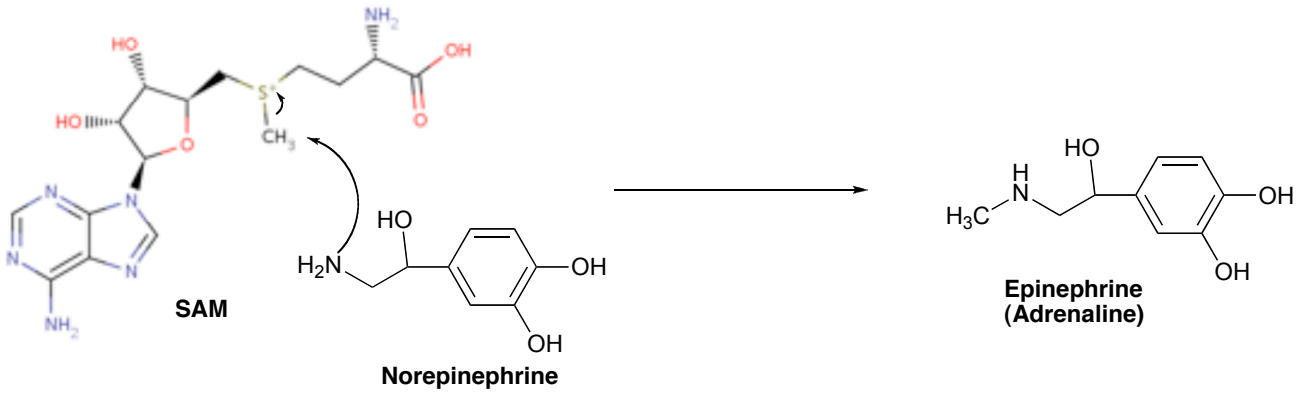
must be oriented to obey 1,2 1,4 rule

note that the products obey the endo rule

Bonus. Explain how S-adenosyl methionine (SAM) acts as a biological methyl transfer agent, giving an example of its reaction with amine nucleophiles.



SAM (S-adenosyl methionine)



Congratulations!
Score:

1. _____ /20
2. _____ /20
3. _____ /15
4. _____ /15
5. _____ /20
6. _____ /10

Bonus: _____ /10
Total: _____ /100