

Chemistry 220b, Section 1

Name \_\_\_\_\_

Exam 3 (100 pts)

Thursday, April 5, 2012

Chapters 13, 15-23

**Write and sign the VU Honor Pledge:**

*I pledge my honor that I have neither given nor received aid on this examination*

*I. M. Honest*

signature

**This exam is closed book and closed notes**

NOTE: It is difficult for me to give you partial credit if you do not show your work!

Neatness counts

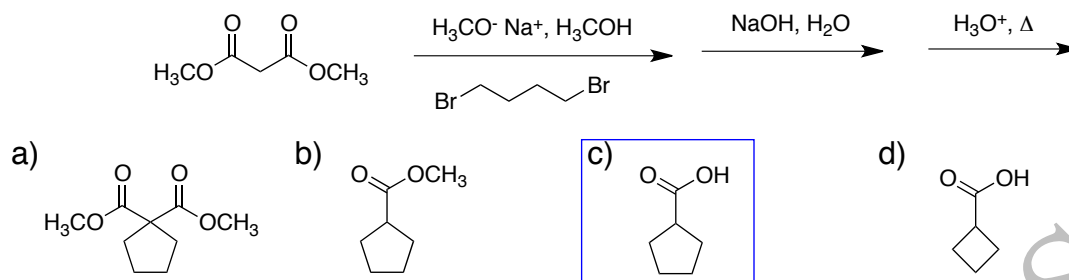
Stereochemistry counts are indicated

Good Luck !!

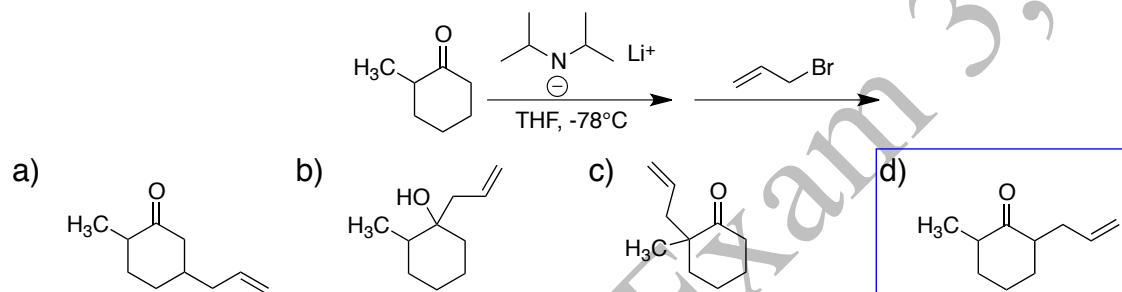
1 <b>H</b> Hydrogen 1.00794							2 <b>He</b> Helium 4.003
3 <b>Li</b> Lithium 6.941	4 <b>Be</b> Beryllium 9.012182	5 <b>B</b> Boron 10.811	6 <b>C</b> Carbon 12.0107	7 <b>N</b> Nitrogen 14.00674	8 <b>O</b> Oxygen 15.9994	9 <b>F</b> Fluorine 18.9984032	10 <b>Ne</b> Neon 20.1797
11 <b>Na</b> Sodium 22.989770	12 <b>Mg</b> Magnesium 24.3050	13 <b>Al</b> Aluminum 26.981538	14 <b>Si</b> Silicon 28.0855	15 <b>P</b> Phosphorus 30.973761	16 <b>S</b> Sulfur 32.066	17 <b>Cl</b> Chlorine 35.4527	18 <b>Ar</b> Argon 39.948

1-10. Multiple Choice. Choose the best answer for each of the following questions. (40 pts)

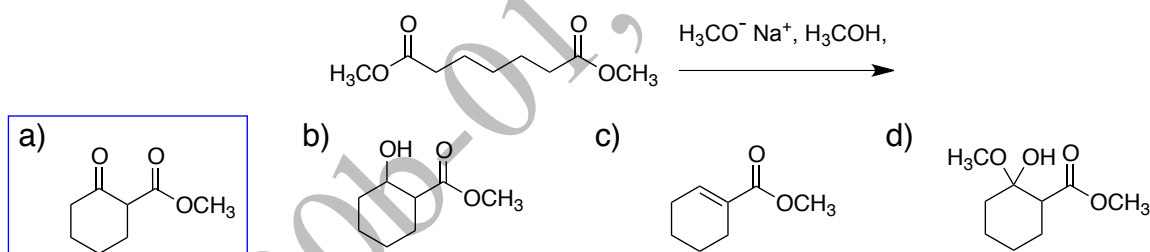
1. What is the final product of the following series of reactions?



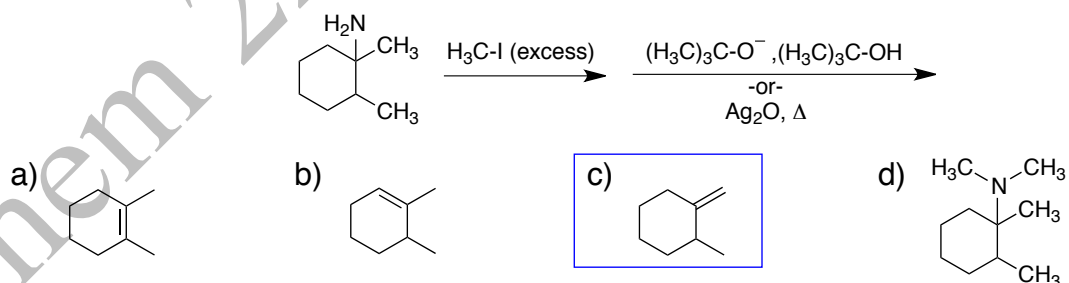
2. What is the product from the following reaction?



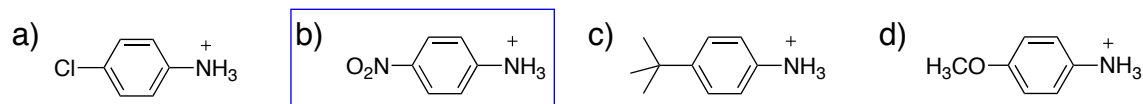
3. What is the product of the following reaction?



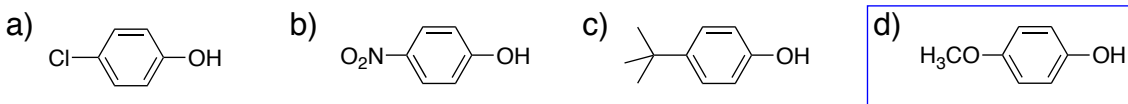
4. Which is predicted to be the major product from the following reactions?



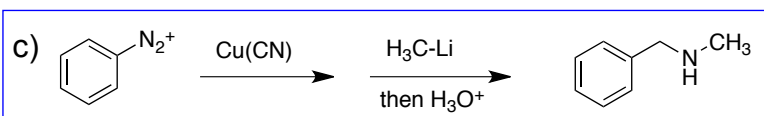
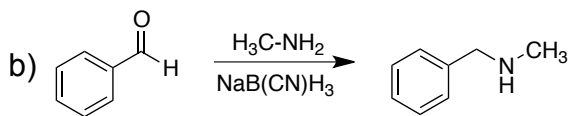
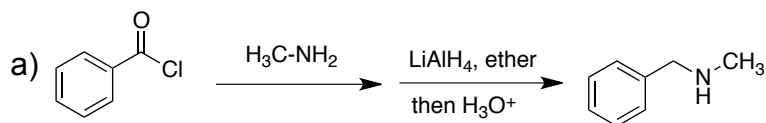
5. Which of the following substituted anilinium ions is expected to be the most acidic?



6. Which of the following substituted phenols is expected to have the highest  $pK_a$  value?

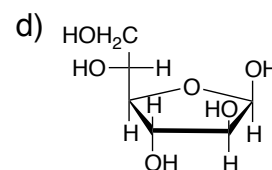
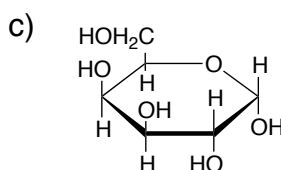
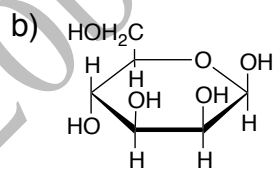
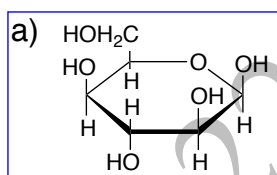
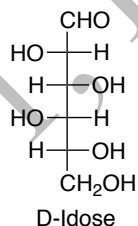


7. Which of the following is *not* a feasible synthesis of *N*-methyl-benzylamine?

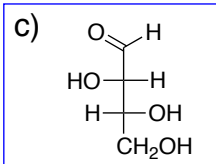
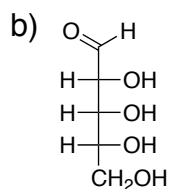
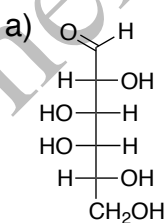


d) none of the above; i.e., **a**, **b**, and **c** are all feasible syntheses of benzylamine

8. Which Haworth formula represents the  $\beta$ -D-pyranose form of D-idose?

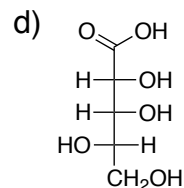
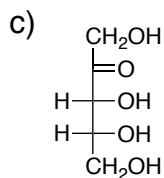
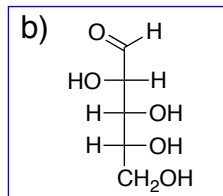
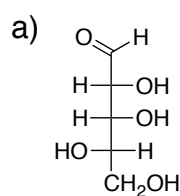


9. Which of the following carbohydrates affords an optically active product upon reaction with  $\text{NaBH}_4$ ?

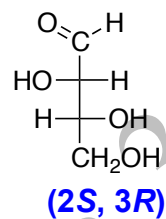
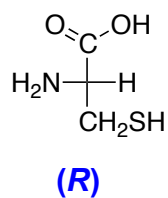


d) **a**, **b**, and **c** all afford optically active product upon reaction with  $\text{NaBH}_4$

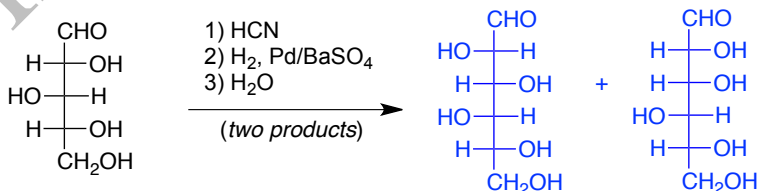
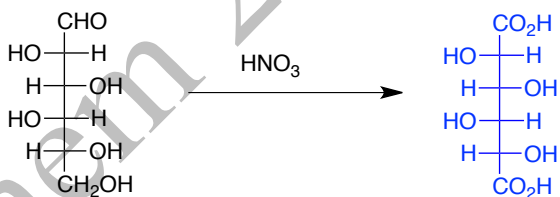
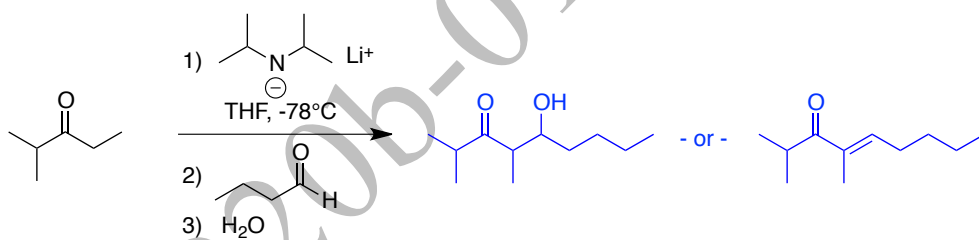
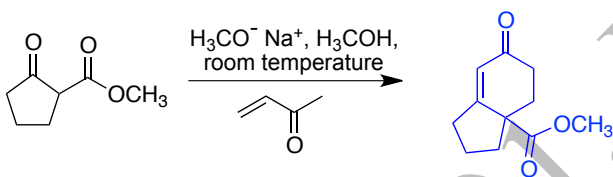
10. Which of the following is a D-aldopentose?



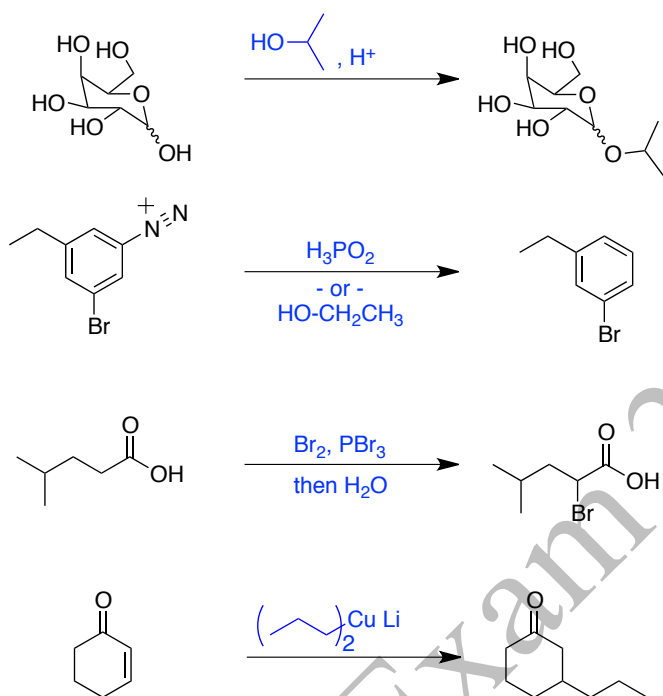
11. Determine the absolute configuration (stereochemistry) of each chiral center. (6 pts)



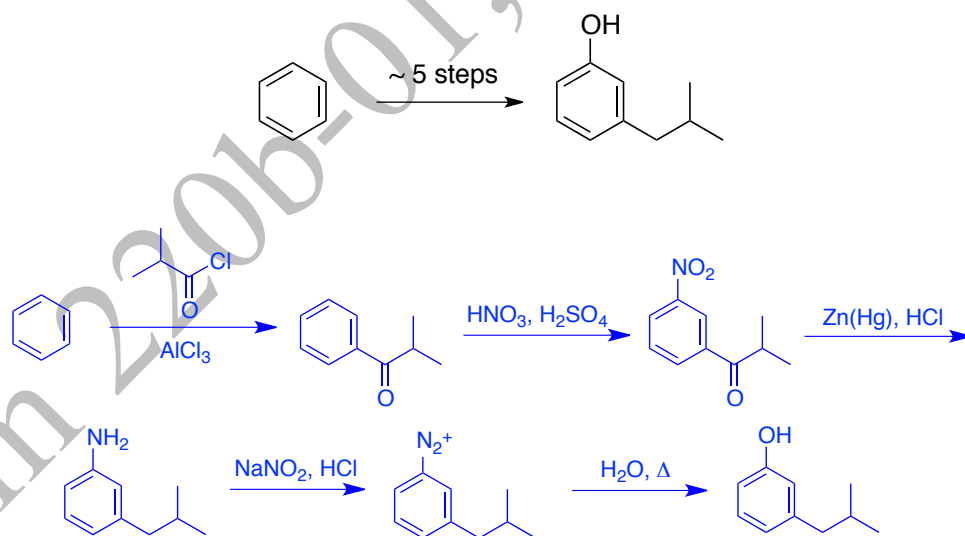
12. Provide the product(s) of the following reactions. (12 pts)



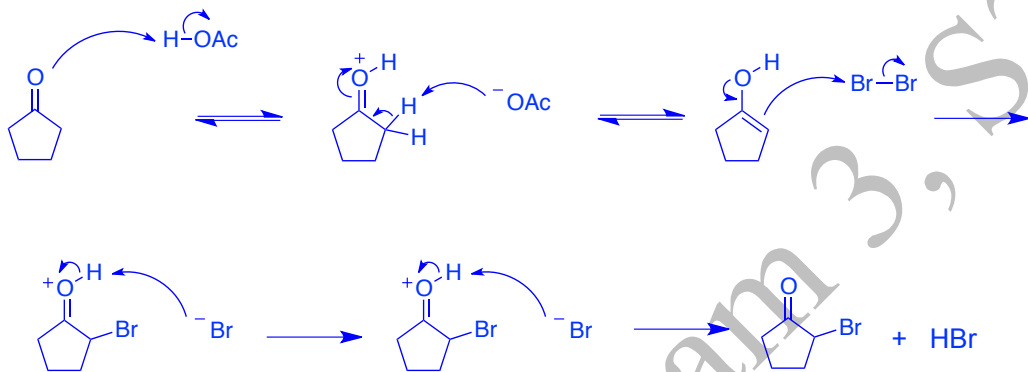
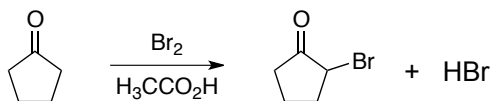
13. Provide the reagents(s) required to complete the following transformations. (12 pts)



14. Synthesize 3-(2-methylpropyl)-phenol from benzene. (10 pts)

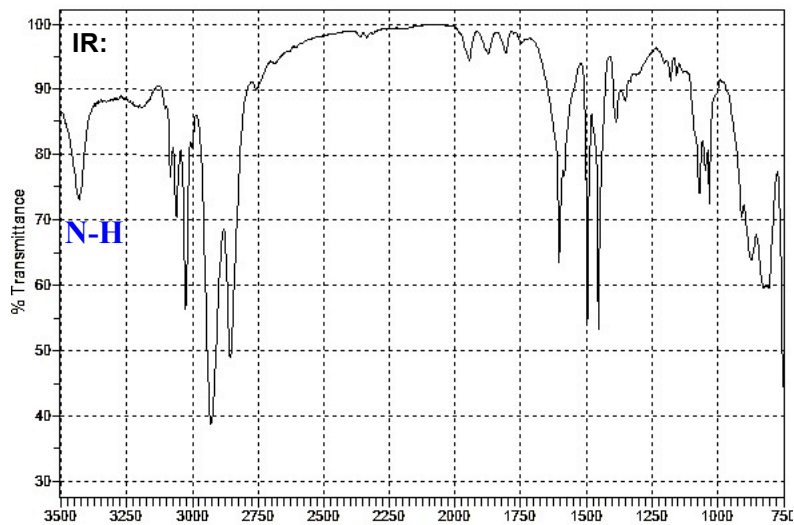


15. Provide a complete, step-wise mechanism for the acid-catalyzed conversion of cyclopentanone to 2-bromocyclopentanone. (10 pts)

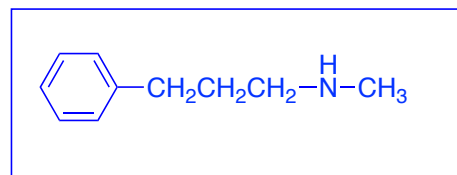
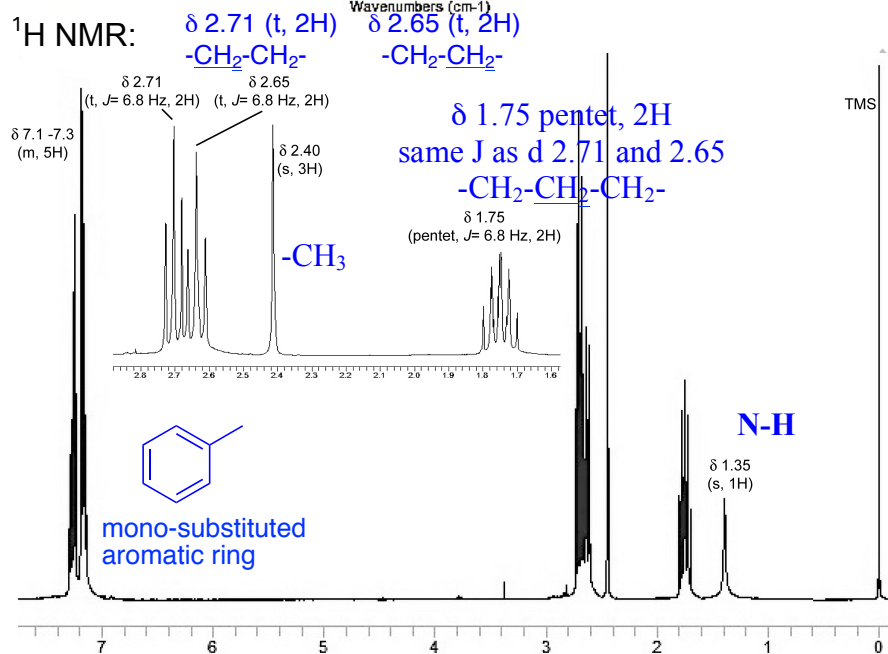


Chem 220b-01, Exam 3, S2012

16. A molecule of formula  $C_{10}H_{15}N$  has the following IR,  $^1H$  and  $^{13}C$  NMR data. Provide a structure that is consistent with the data. *Please circle your final answer.* (10 pts)



4 degrees of unsaturation



$^{13}C$  NMR:  $\delta$  142.1, 128.5, 127.3, 125.7, 54.2, 40.8, 35.4, 33.2

Chemistry

Chem 220b-01, Exam 3, S2012

---

Problem 1-10: \_\_\_\_\_ (40 pts)

11: \_\_\_\_\_ (6 pts)

12: \_\_\_\_\_ (12 pts)

13: \_\_\_\_\_ (12 pts)

14: \_\_\_\_\_ (10 pts)

15: \_\_\_\_\_ (10 pts)

16: \_\_\_\_\_ (10 pts)

Total out of 100: \_\_\_\_\_