

Chemistry 220b, Section 1
Exam 2 (100 pts)
Thursday, February 26, 2015
Chapters 13, 15-19

Name _____

Write and sign the VU Honor Pledge:

*I pledge on my honor that I have neither given nor
received unauthorized 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

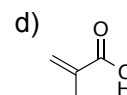
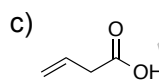
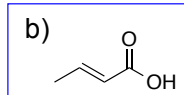
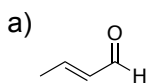
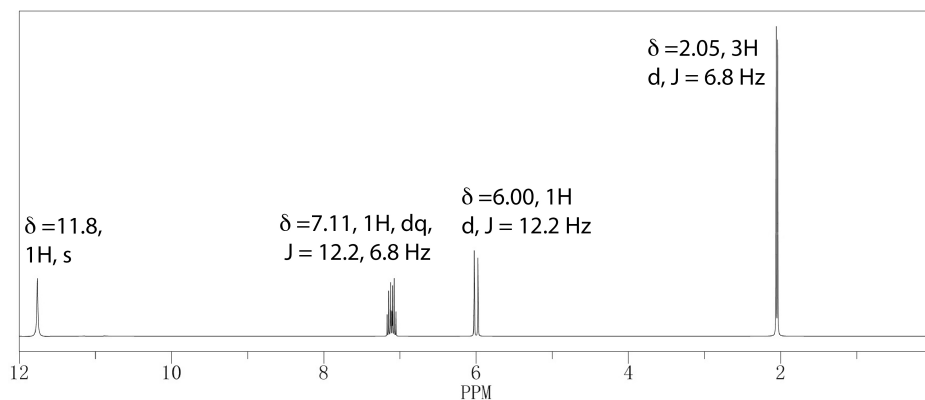
Stereochemistry counts are indicated

Good Luck !!

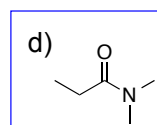
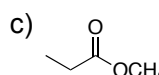
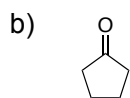
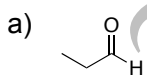
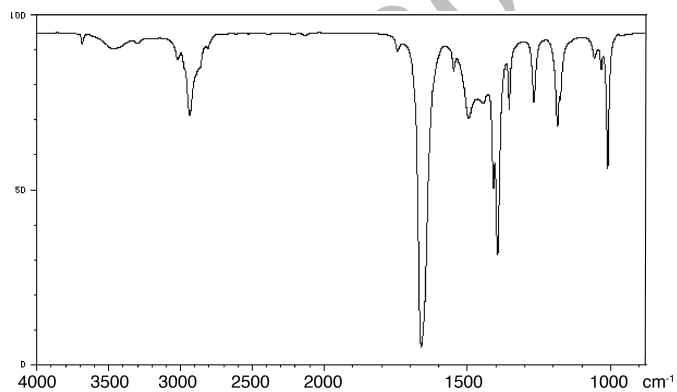
1 H Hydrogen 1.00794								2 He Helium 4.003
3 Li Lithium 6.941	4 Be Beryllium 9.012182	5 B Boron 10.811	6 C Carbon 12.0107	7 N Nitrogen 14.00674	8 O Oxygen 15.9994	9 F Fluorine 18.9984032	10 Ne Neon 20.1797	
11 Na Sodium 22.989770	12 Mg Magnesium 24.3050	13 Al Aluminum 26.981538	14 Si Silicon 28.0855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

1 – 15. Multiple Choice. Choose the best answer for each of the following questions. (60 pts)

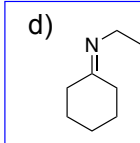
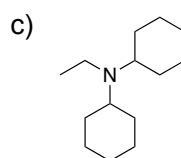
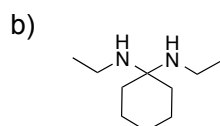
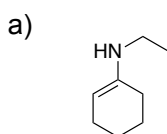
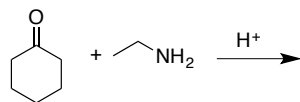
1. Which structure is most consistent with the following ^1H NMR spectrum?



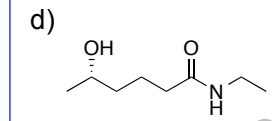
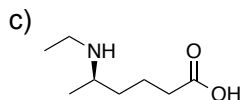
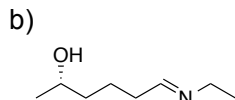
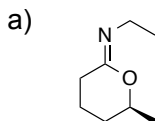
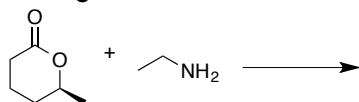
2. Which structure is most consistent with the following IR spectrum?



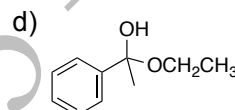
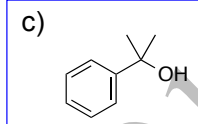
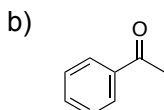
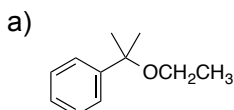
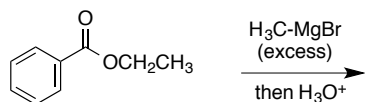
3. What is the product of the following reaction?



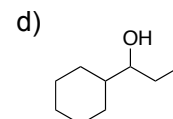
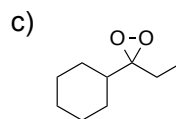
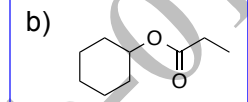
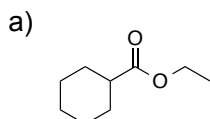
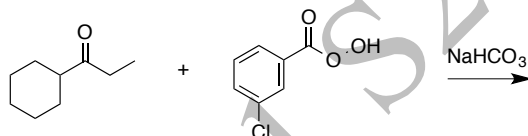
4. What is the product of the following reaction?



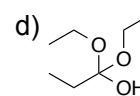
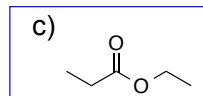
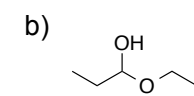
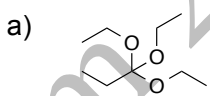
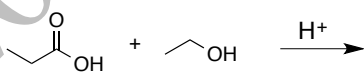
5. What is the product of the following reaction?



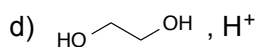
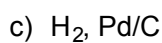
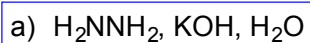
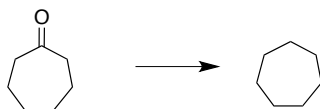
6. What is the product from the following reaction?



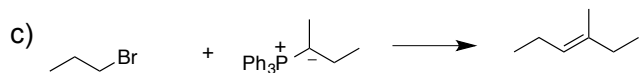
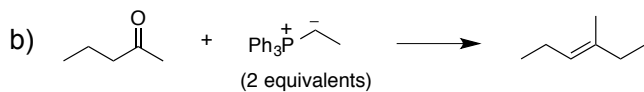
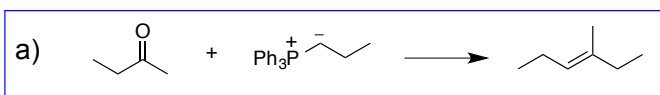
7. What is the product from the following reaction?



8. What is the best reagent for the following reaction?



9. Which combination of reactants will give (*E*)-3-methyl-3-hexene as the product?



d) all of the above; i.e., **a**, **b**, and **c** will all afford (*E*)-3-methyl-3-hexene

10. What is the best reagent for the conversion of a primary amide to a nitrile?



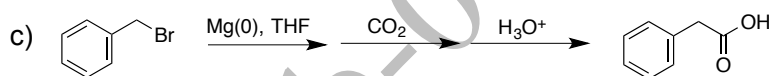
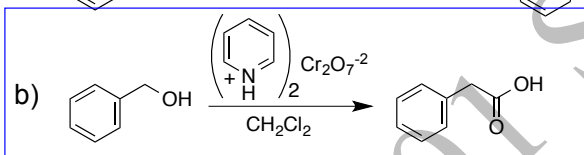
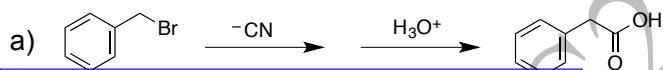
a) P_4O_{10} , heat

b) H_3O^+ , heat

c) H_2 , Pd/C

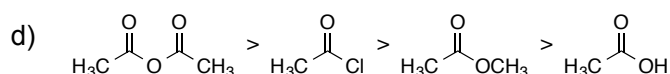
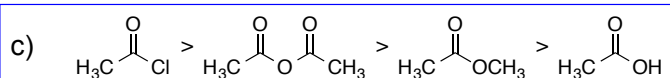
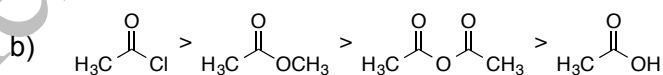
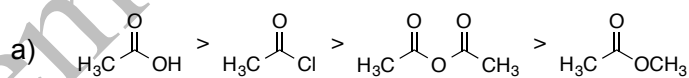
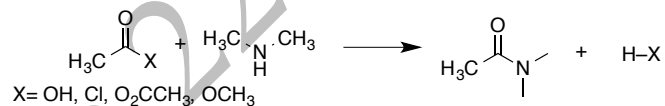
d) NaCN, then H_3O^+

11. Which reaction or reaction sequence does not afford phenylacetic acid?

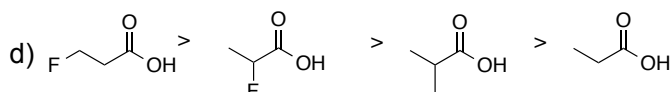
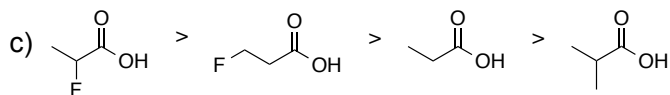
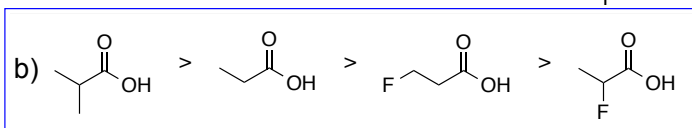
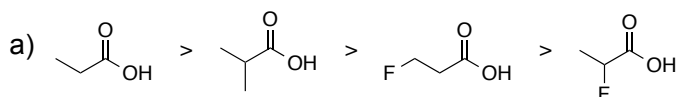


d) none of the above; i.e., **a**, **b**, and **c** are all afford phenylacetic acid

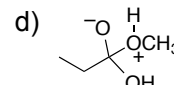
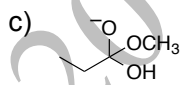
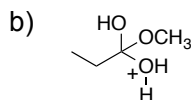
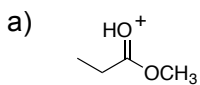
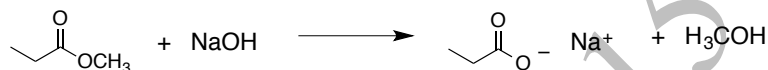
12. What is the order of reactivity, from most reactive to least reactive, for the following reaction?



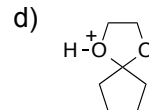
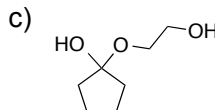
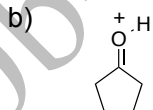
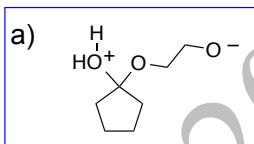
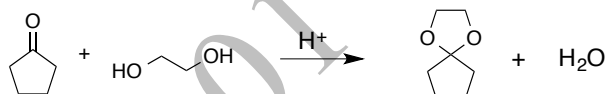
13. Arrange the following carboxylic acids from the highest pK_a value to lowest pK_a value.



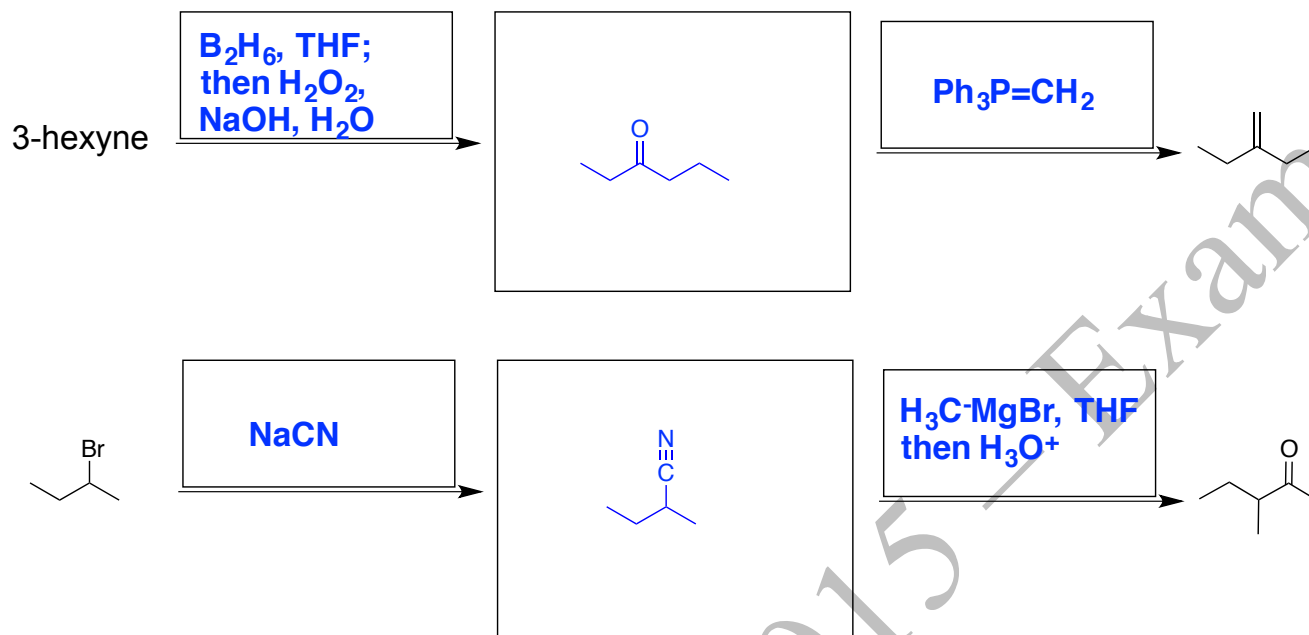
14. Which structure is an intermediate in the saponification of an ester?



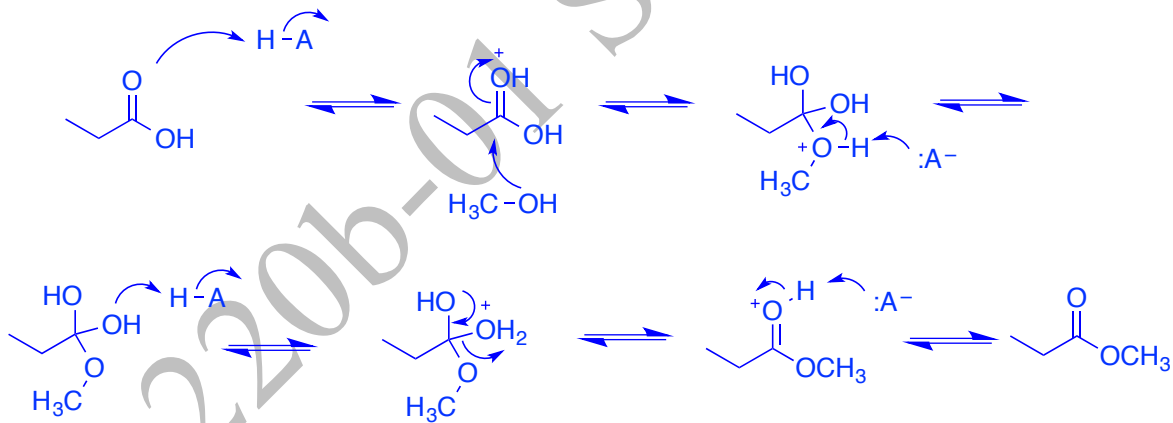
15. Which structure is not an intermediate in the formation of a ketal?



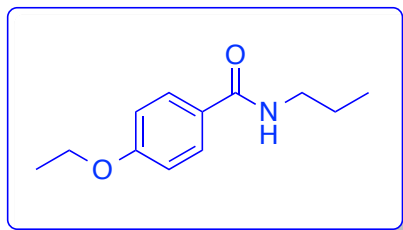
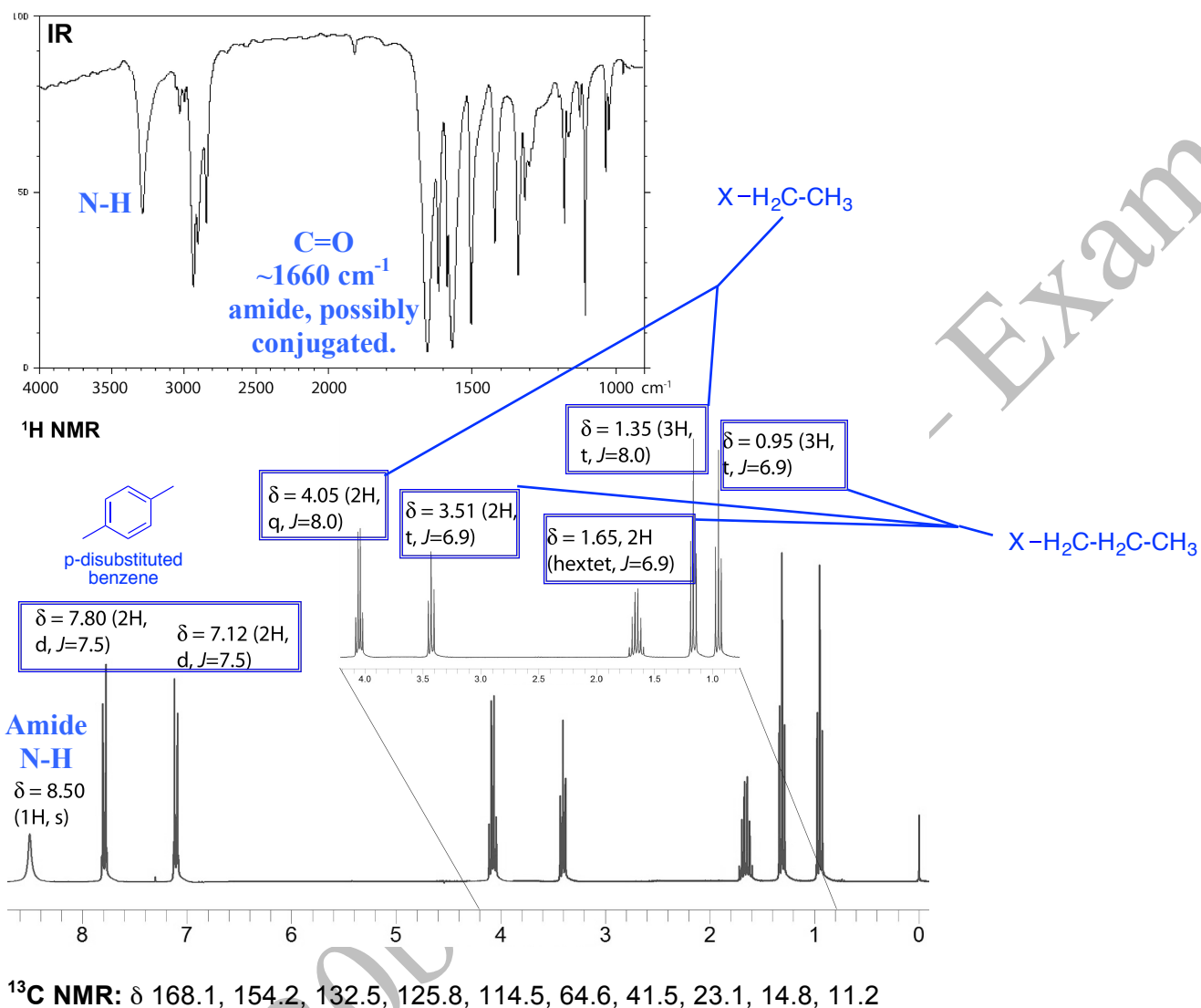
16. The following transformations cannot be done in a single step. Complete the following by providing the correct reagents and the structure of the intermediate. (18 pts)



17. Give a complete, stepwise mechanism for the acid-catalyzed reaction of propionic acid and methanol to afford methyl propionate. (12 pts)



18. A molecule with the formula $C_{12}H_{17}NO_2$ has the IR, 1H and ^{13}C NMR spectra shown below. Provide a structure that is consistent with the data. *Please circle your final answer.* (10 pts)



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Problem 1-15: _____ (60 pts)

16: _____ (18 pts)

17: _____ (12 pts)

18: _____ (10 pts)

Total out of 100: _____