name:

Chemistry 3311-100
Organic Chemistry/Dr. Barney Ellison
Thursday: Feb. 13th @ 7:00pm → 9:00/1st Exam/Math 100

Name: KEY (please print)

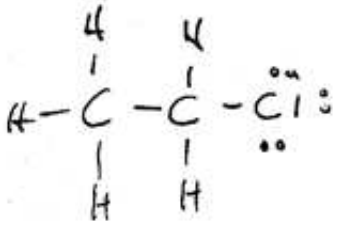
1. (10 pts) Write a Lewis structure for each of the following Lewis structures.

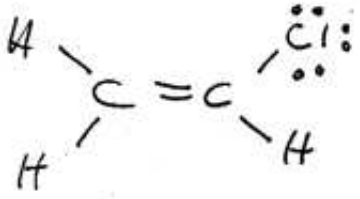
a) $C_2H_5C\ell$ (ethyl chloride)

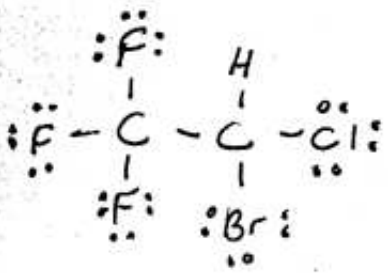
b) $C_2H_3C\ell$ (vinyl chloride)

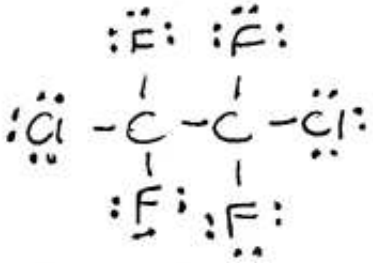
c) $C_2HBrC\ell F_3$ (halothane; all three fluorines are bonded to same C)

d) $C_2C\ell_2F_4$ (Freon 114; each carbon bears one chlorine)









2. (10 pts) Calculate K_a for each of the following acids, given its pK_a. Rank the compounds in order of decreasing acidity.

Strongest acid <——————————> Weakest acid

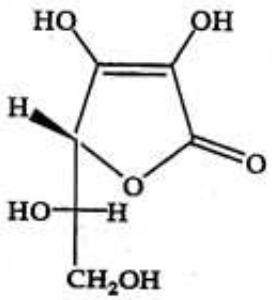
oxalic acid > aspirin > formic acid > ascorbic acid

Aspirin, $pK_a = 3.48$ $K_a = 10^{-3.48}$

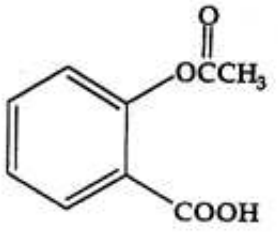
Formic acid (HCOOH) $pK_a = 3.75$ $K_a = 10^{-3.75}$

Oxalic acid (HOOC-COOH), $pK_a = 1.19$ $K_a = 10^{-1.19}$

Ascrobic acid, $pK_a = 4.17$ $K_a = 10^{-4.17}$



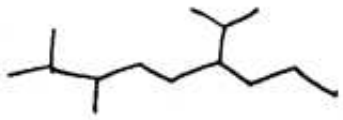
L-ascorbic acid



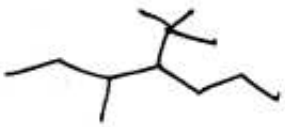
aspirin

3. (10 pts) Write a structural formula for each of the following compounds:

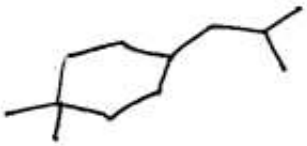
a) 6-Isopropyl-2,3-dimethylnonane



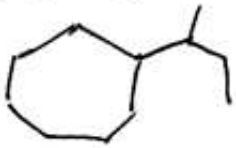
b) 4-*tert*-Butyl-3-methylheptane



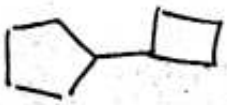
c) 4-Isobutyl-1,1-dimethylcyclohexane



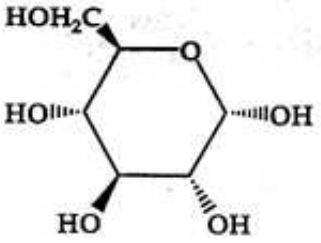
d) *sec*-Butylcycloheptane

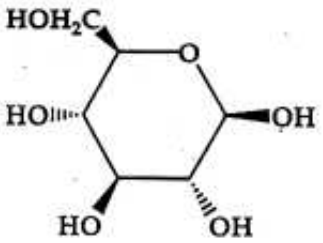


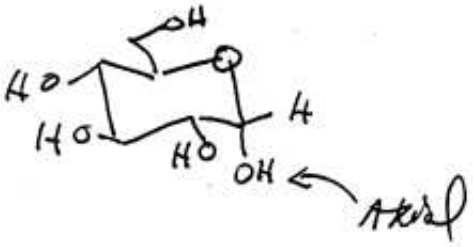
e) Cyclobutylcyclopentane

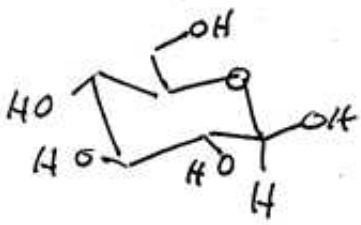


4. (10 pts) Two forms of glucose are drawn below. The six-membered ring is known to exist in a chair conformation in each form. Are they different representations of the same molecule or are they stereoisomers? What substitutents occupy the axial sites?





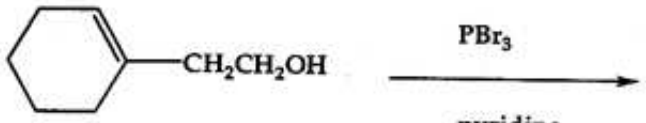


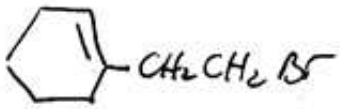


Stereoisomers

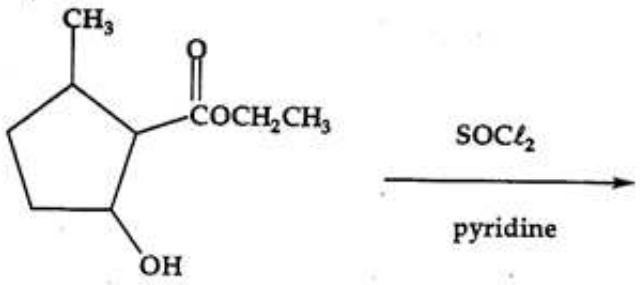
5. (10 pts) Write the structure of the principal organic product of each reaction.

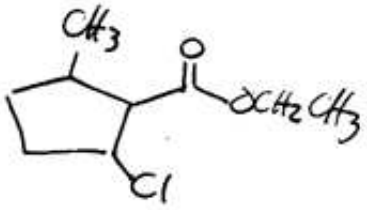
a)



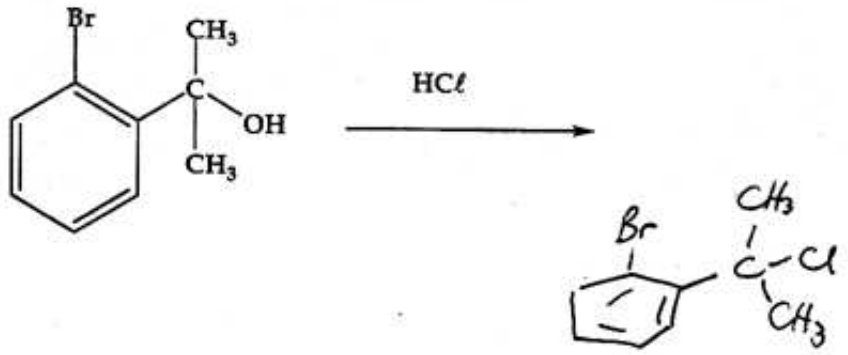


b)

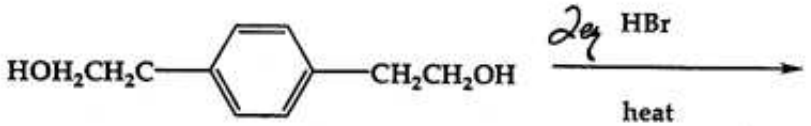




c)

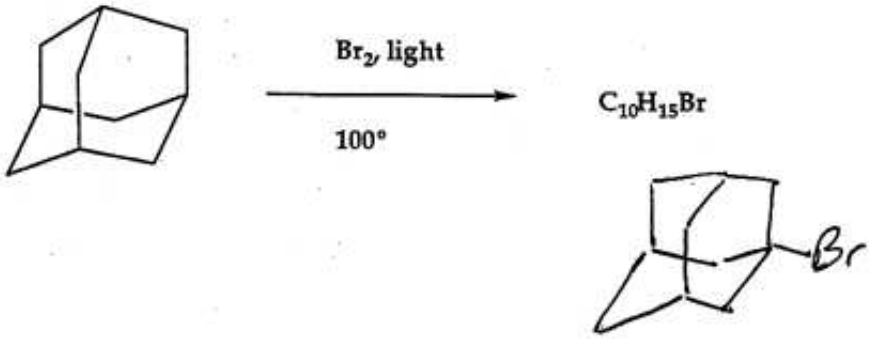

Br
CH3
C
OH
CH3
HCℓ
Br
CH3
C
Cl
CH3

d)


HOH2CH2C
CH2CH2OH
2eq HBr
heat

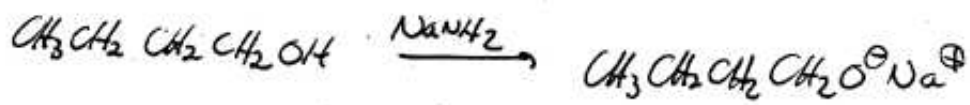

Br -CH2-CH2
CH2CH2 Br

e)

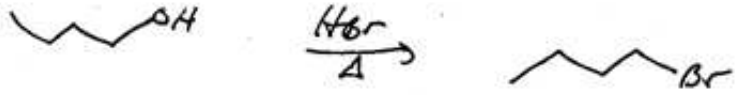

Br2, light
100°
C10H15Br
Br

6. (10 pts) Write the chemical equation for the reaction of 1-butanol with each of the following:

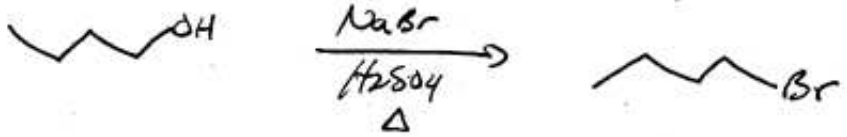
a) $NaNH_2$



b) HBr/heat



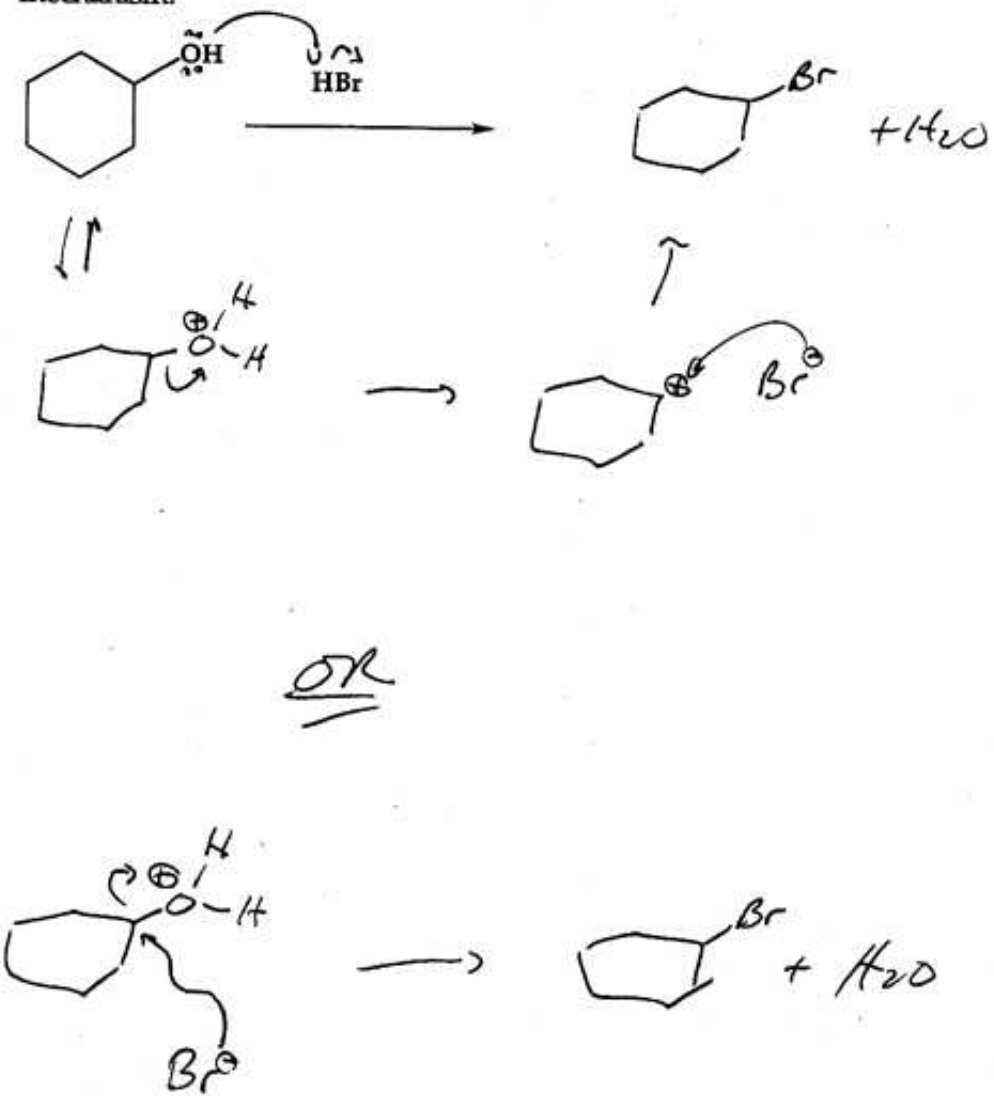
c) $NaBr/H_2SO_4$/heat



d) PBr_3

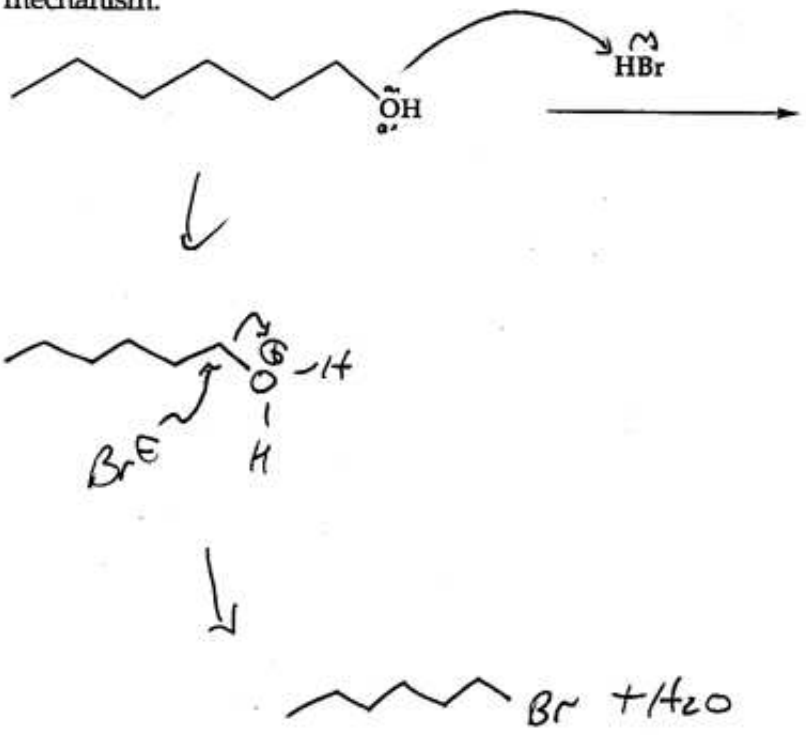
e) $SOCl_2$

7. (10 pts) What is the product of the following reaction? Write me a mechanism.



OR

8. (10 pts) What is the product of the following reaction? Write me a mechanism.



9. (20 pts) Cyclopropyl chloride has been prepared by the free-radical chlorination of cyclopropane. Write me a mechanism.