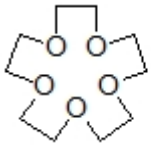
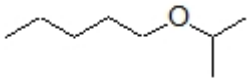
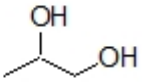
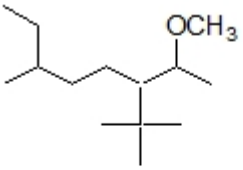
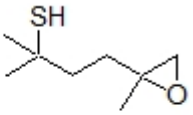
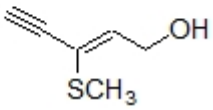
I. **Nomenclature**:

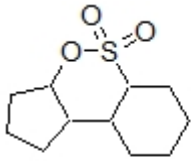
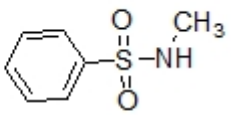
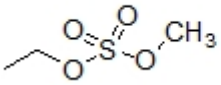
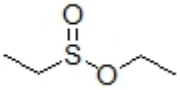
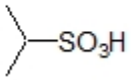
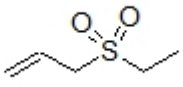
1. Provide the common name for each of the following structures. (9 points)

2. Using IUPAC rules, correctly name each structure below. Indicate correct stereochemistry where needed. (15 points)

3. Circle all structures below that contain a sulfonate ester. (4 points)

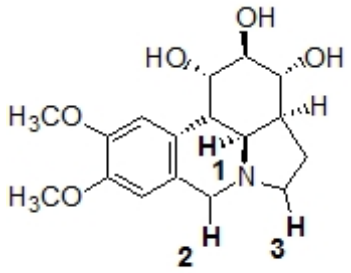







II. **Theory**:

1. Circle all of the following values that has an impact on the thermodynamics of a reaction. (6 points)

a) ΔH b) K_{eq} c) k d) ΔS e) E_a

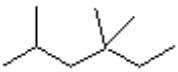
2. The following structure was reported in *Tetrahedron Letters*, **2012**, 123. Which sequence ranks the following protons in order of increasing pK_a value? (6 points)



parkacine

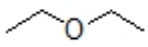
a) 1<2<3 b) 2<3<1 c)3<1<2 d) 3<2<1 e) 2<1<3 f) 1<3<2

3. How many monochlorination products would result from the chlorination of the following hydrocarbon? (4 points)

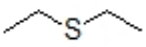


a) 4 b) 5 c) 6 d) 7 e) 9

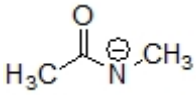
4. Circle the strongest nucleophile in the pair below. (4 points)



or



5. State the hybridization of nitrogen in the structure below. (4 points)

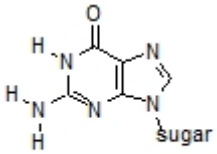


6. Which isomer of chloroanisole has the smallest molecular dipole moment? (3 points)

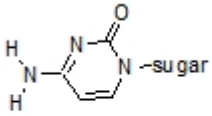
a) cis b) para c) meta d) vicinal e) ortho

7. If a compound has a molecular formula of $C_{11}H_{21}N_2OCl$, how many degrees of unsaturation does it have? (3 points)

8. Shown below are two matching DNA base pairs guanine, a purine, and cytosine, a pyrimidine. The two structures are tightly held together through three hydrogen bonding interactions. Draw a line connecting each donor to each acceptor for each hydrogen bond and then circle the donor in each pair. (6 points)

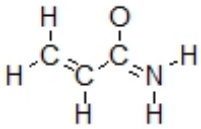


guanine

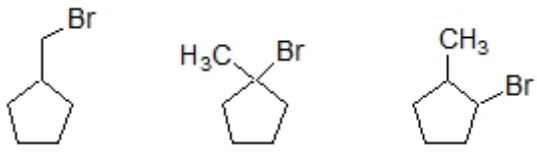


cytosine

9. Fill in any missing formal charges in the structure below. Then provide 3 additional structures which contribute to the overall resonance hybrid. Circle the major contributing structure. (10 points)



10. Which sequence ranks the following alkyl bromide structures in order of increasing reactivity in an S_N1 reaction? (4 points)

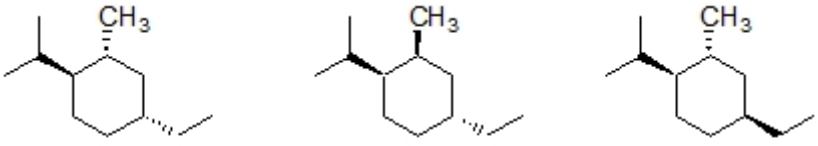


1 **2** **3**

a) 1<2<3 b) 2<3<1 c)3<1<2 d) 3<2<1 e) 2<1<3 f) 1<3<2

III. Conformations and Stereochemistry

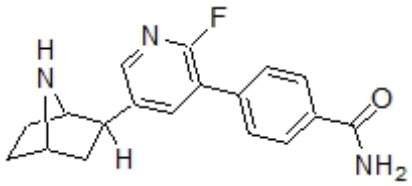
1. Drawn in their most stable chair conformation, which sequences ranks the following structures in order of increasing stability. (6 points)



1 **2** **3**

a) 1<2<3 b) 2<3<1 c)3<1<2 d) 3<2<1 e) 2<1<3 f) 1<3<2

2. The following structure is an acetyl choline antagonist proposed to help break nicotine addiction (*J. Med. Chem*. **2012**, 6512). Label each chiral center as *R* or *S* configuration. (9 points)

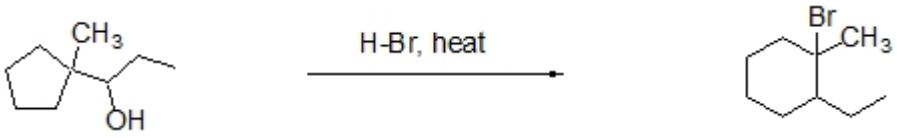


3. What is the stereochemical relationship between the two structures below. (4 points)

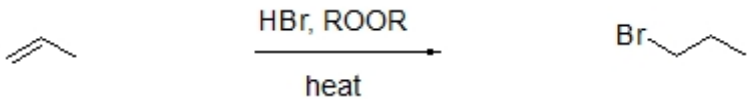
(*2R, 4R*) pentan-2,4-diol (*2R, 4S*) pentan-2,4-diol

IV. Mechanism:

1. Provide a mechanism for the following reaction. Include all intermediates, formal charges and correct pushing of electrons. (15 points)

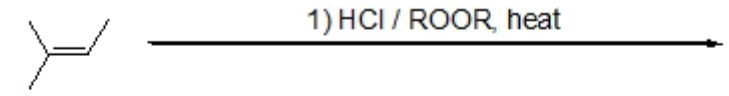


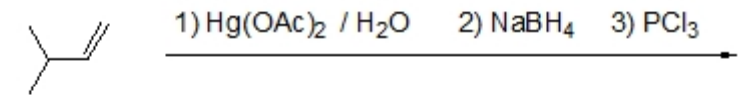
2. Provide an arrow-pushing mechanism for the propagation steps of the following reaction. (12 points)



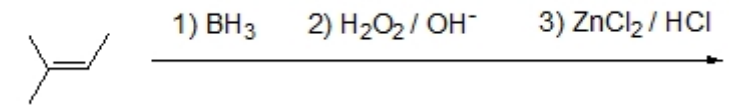
V. **Reactions**:

1. Circle all methods that would successfully produce 2-chloro-3-methylbutane. (6 points)

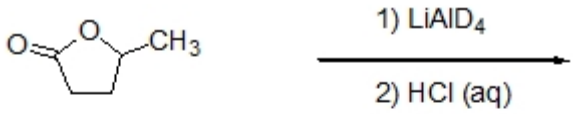
a) 

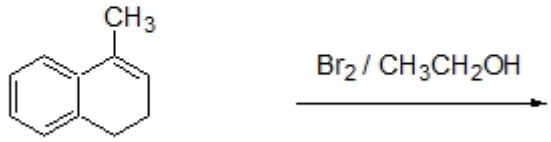
b) 

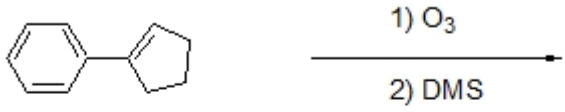
c) 

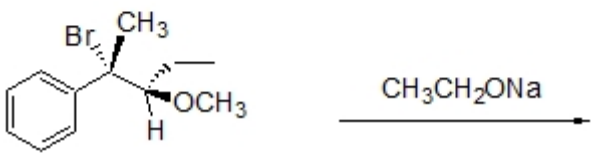
d) 

2. Complete each of the following reactions by providing a correct structure of each expected product. Include correct stereochemistry where applicable. (24 points)

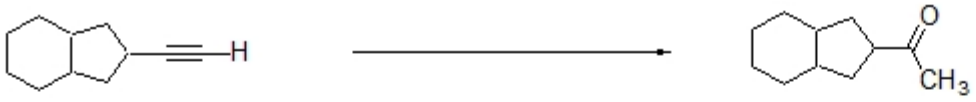


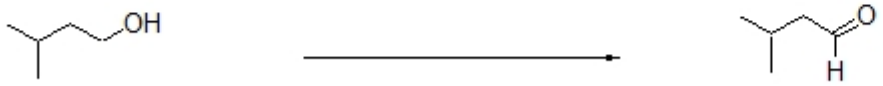


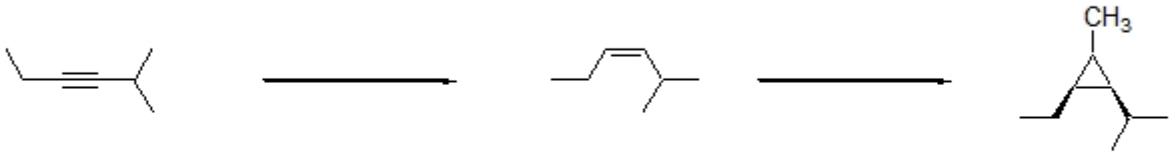


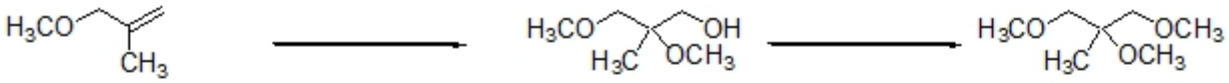


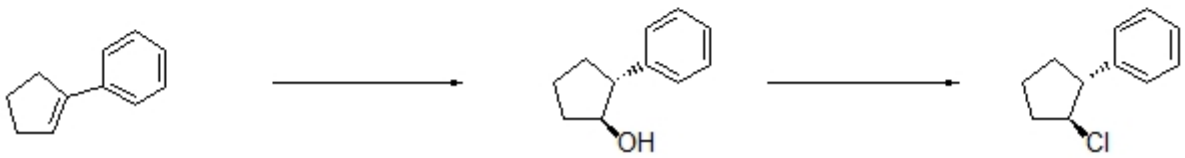
3. Fill in the missing reagents for each of the following reaction. (46 points)





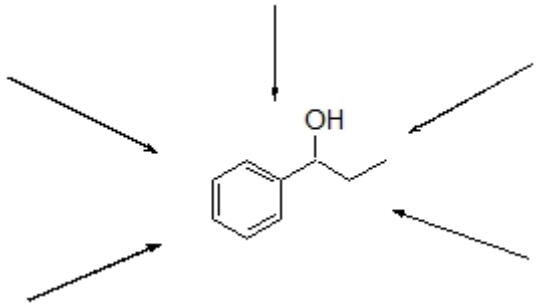






VI. **Extra Credit**:

1. Beginning with 5 different starting materials, provide 5 methods of synthesis for the following alcohol. (10 points)



You received _____ points out of 200 points possible. To check your overall performance in lecture see http://canvas.weber.edu .

A study is being conducted to determine what factors strongly effect academic performance in either a positive or negative manner. The intent of the collected data is to assist me in better advising students on how to be successful in Organic Chemistry. It is anticipated that the results of this survey will be published in a pedagogical journal, such as The Journal of Chemical Education. Be assured your responses to this survey will be held completely anonymous since the survey will be separated from your exam before processing data. Your choice to participate in this survey will neither effect your grade positively or negatively, and you are free to terminate your participation at any time. If you have any questions, please contact me, Dr. Don Davies, at 801-626-6224 or ddavies1@weber.edu .

I predict I received _____ points out of 200 points possible on this exam. Actual score ____.

	In the last 2 weeks how often did you:	never						always
2	Read the material planned for the following lecture?	1	2	3	4	5	6	7
3	Complete the assigned homework problems?	1	2	3	4	5	6	7
4	Complete quizzes /exams from previous semesters?	1	2	3	4	5	6	7
5	Highlight and summarize the book and/or notes?	1	2	3	4	5	6	7
6	Make and review flash cards?	1	2	3	4	5	6	7
7	Participate in a study group?	1	2	3	4	5	6	7
8	Attend supplemental instruction sessions?	1	2	3	4	5	6	7
9	Verbally explain principles to another individual?	1	2	3	4	5	6	7
10	Write assessment questions of your own?	1	2	3	4	5	6	7
11	Receive 6 or more hours of sleep?	1	2	3	4	5	6	7
12	Go to bed & arise at the same time (M-Th) (+/- 1 hr)?	1	2	3	4	5	6	7
13	Maintain the same sleep pattern on the weekend?	1	2	3	4	5	6	7
14	State your level of anxiety on this exam. (1 is low, 7 is high)	1	2	3	4	5	6	7
15	How well do you like Organic Chemistry? (1 is low, 7 is high)	1	2	3	4	5	6	7
	Enter the value to the right of each question below							
16	How many hours of sleep did you receive last night?							
17	In the last 2 weeks about how many hours / day did you study for this class?							
18	In the last 2 weeks how many hours / week committed elsewhere (work, church, etc....)?							
19	In the last 2 weeks how many days / week did you meet with a tutor?							
20	What was your letter grade in Chem 1220 (Gen. Chem.)?							