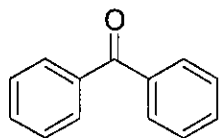


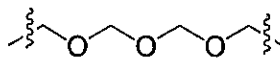
I. Nomenclature

1. Name the following structures. (4 points)

historical common name:

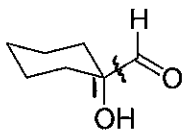


benzophenone



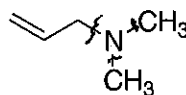
paraformaldehyde

2. Provide the indicated name for each of the structures below. (5 points)



IUPAC:

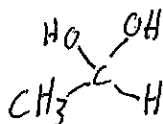
1-hydroxycyclohexane carbaldehyde



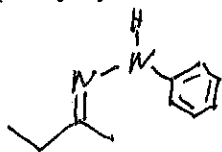
Common:

allyldimethylamine

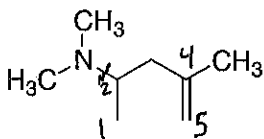
3. Draw a structure for the hydrate of acetaldehyde. (2 points)



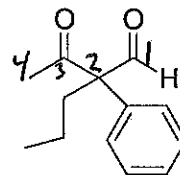
4. Draw the phenylhydrazone derivative of ethyl methyl ketone. (2 points)



5. Correctly name each of the following compounds. (6 points)



4,N,N-trimethyl pent-4-en-2-amine



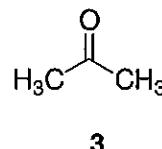
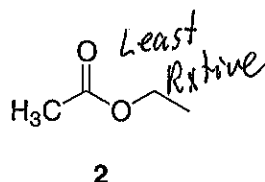
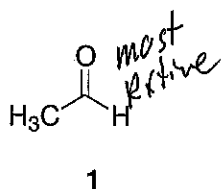
3-oxo-2-phenyl-2-propylbutanal

**II. Theory**

1. Name 2 advantages of marketing alkaloid drugs as a hydrochloride salt. (4 points)

- a) Becomes hydrophilic - H<sub>2</sub>O soluble      c) Reduce vapor pressure - less odor
- b) convert oils to solids (tablet)      d) Increase stability = Increased shelf life

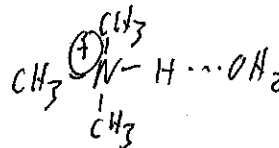
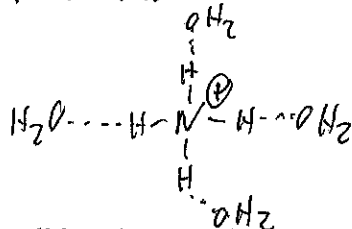
2. Which sequence correctly ranks the following compounds in order of increasing reactivity toward nucleophilic addition? (3 points)



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

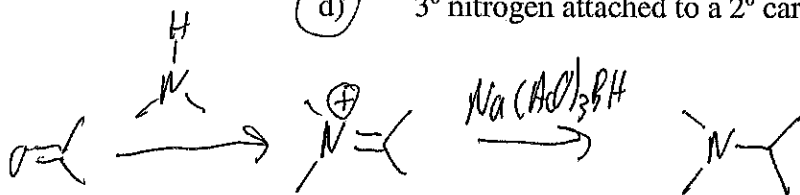
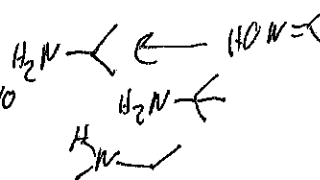
3. Of the two opposing factors that affect the basicity of aliphatic amines, which factor favors ammonia being more basic than a tertiary amine? Justify your answer with a diagram. (3 points)

*Solvation of ammonium salt*



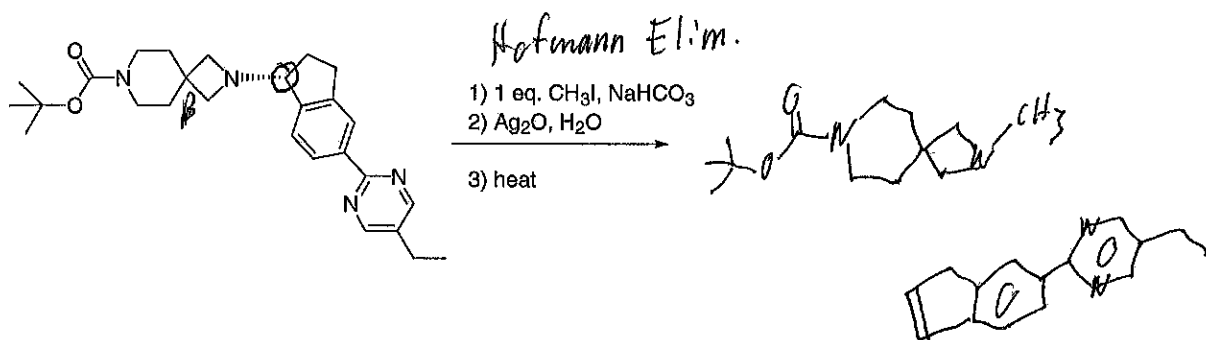
4. Circle all bonds types that can be constructed using reductive amination. (3 points)

- a)  1° nitrogen attached to a 2° carbon
- b)  1° nitrogen attached to a 3° carbon *No*
- c)  2° nitrogen attached to a 1° carbon
- d)  3° nitrogen attached to a 2° carbon

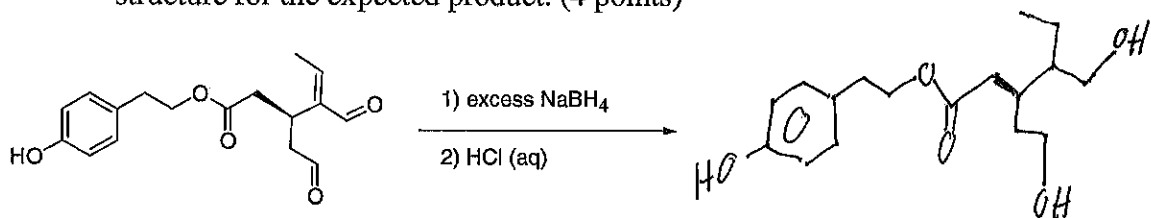


### III. Reactions

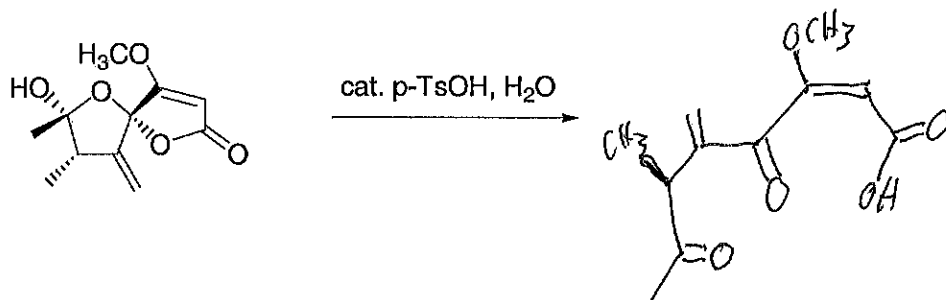
1. The following structure is being examined for effectiveness in treating type 2 diabetes (*Tet. Lett.* **2012**, 6351). Circle all **chiral centers** in the structure. Then complete the reaction below. (6 points)



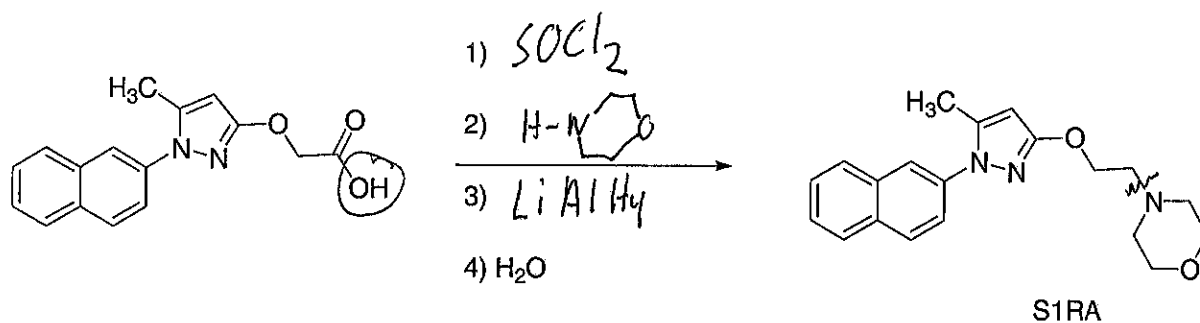
2. Oleocanthal is an anti-inflammatory compound found in extra virgin olive oil (*J. Nat Prod.* **2012**, 1584). Complete the following reaction by drawing a correct structure for the expected product. (4 points)



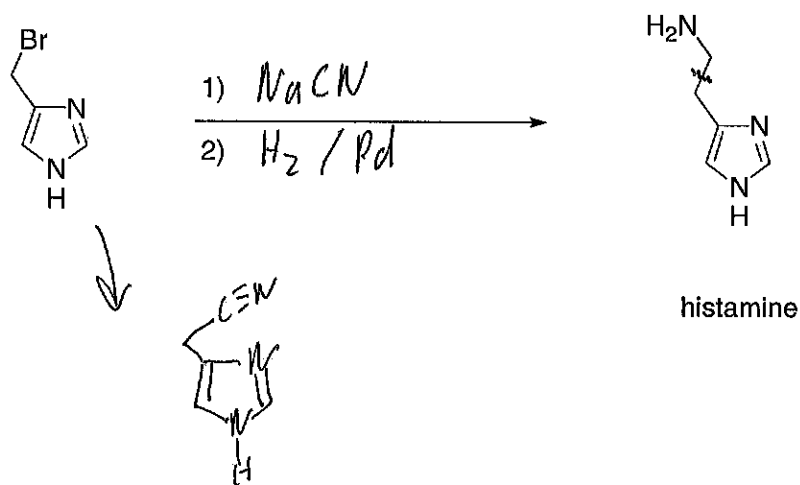
3. Papyracillic acid A, isolated from the fungus *Lachnum papyraceum*, has cytotoxic activity (*J. Org. Chem.* **2012**, 9171). Complete the reaction below. (4 points)



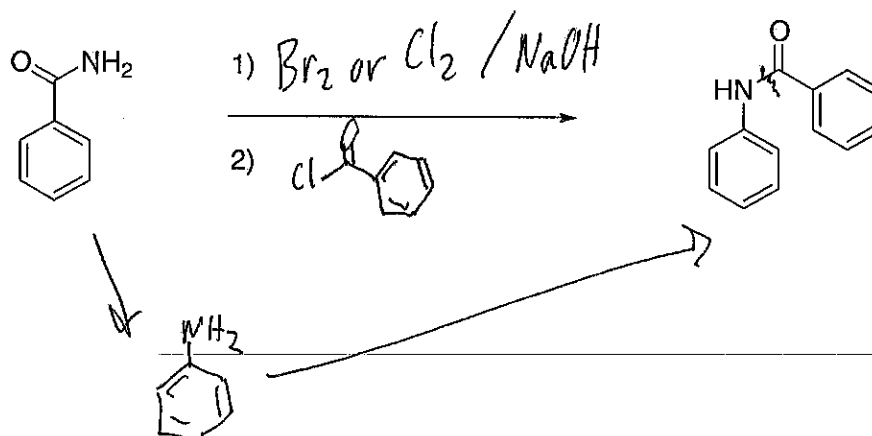
4. S1RA, shown below, has shown to be effective in treating neuropathic pain (*J. Med. Chem.* **2012**, 8209). Show how S1RA can be made from the indicated carboxylic acid starting material. (6 points)



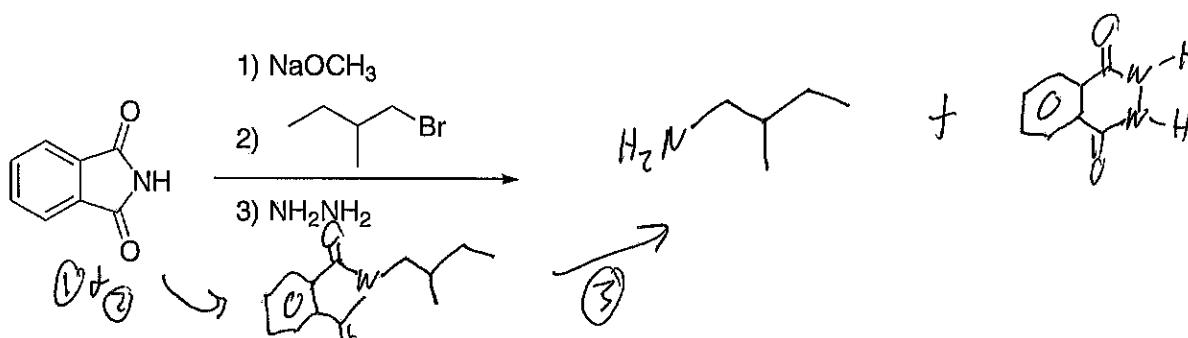
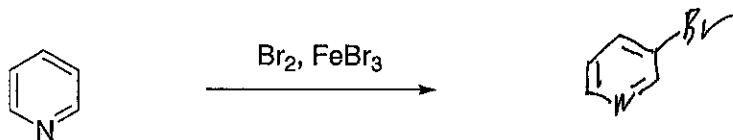
5. Complete the following reaction by filling in the necessary reagents. (4 points)



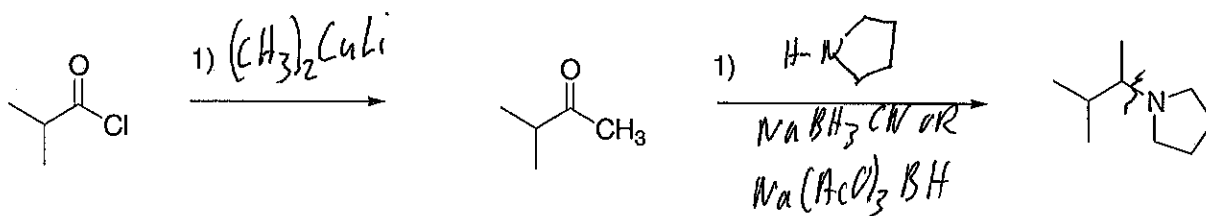
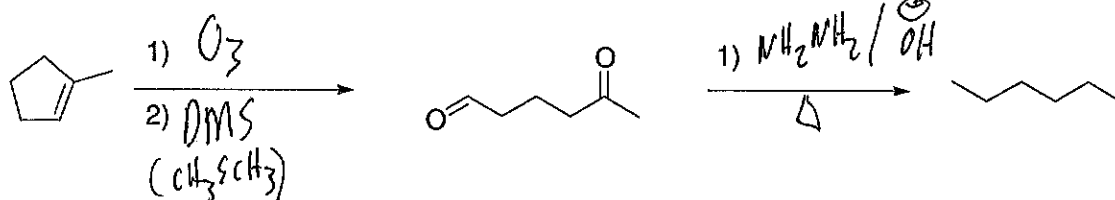
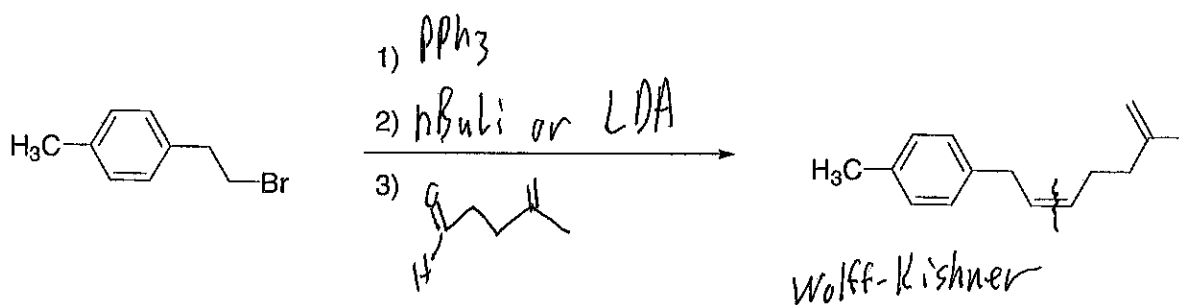
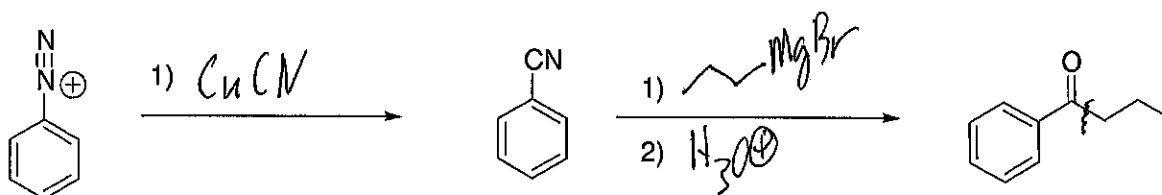
6. Show what reagents are needed to carry out the following transformation. (4 points)



7. Predict the structure of the product of each of the following reactions. (6 points)

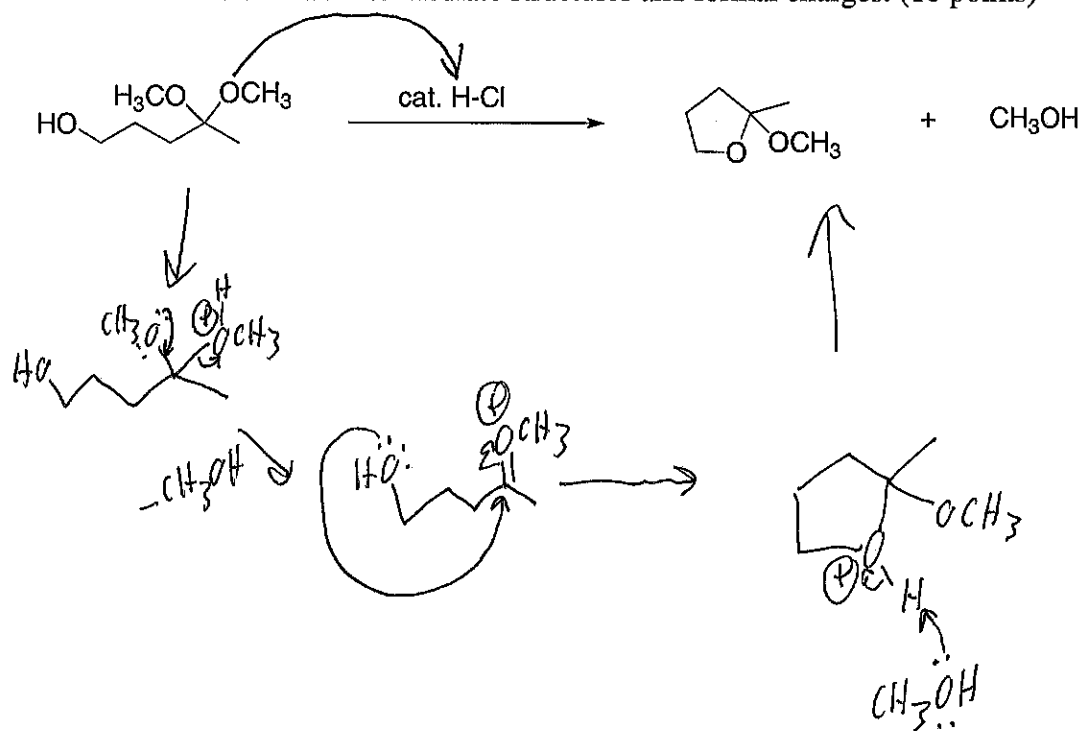


8. Complete each reaction below by filling in the necessary reagents. (24 points)



## IV. Mechanism

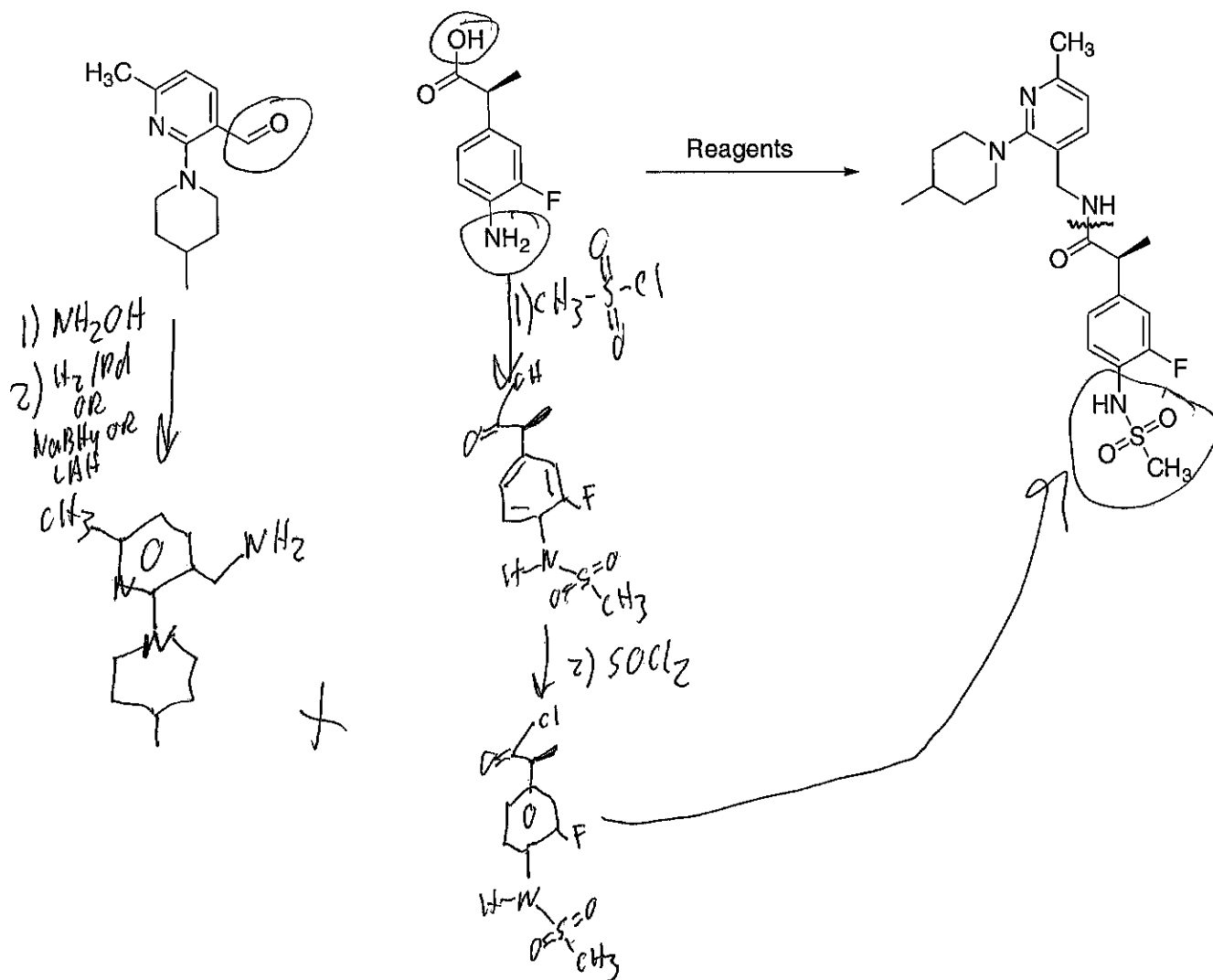
1. Provide an arrow pushing mechanism for the conversion from one acetal to the other. Show all intermediate structures and formal charges. (10 points)



HCl  $pK_a = -6$   
 $\text{CH}_3\text{OH}^+ \text{H} \text{ } pK_a = -1$

## VI. Extra Credit (5 points possible)

The structure below inhibits pain reception by decreasing the transport of calcium ions into cells (*J. Med. Chem.* 2012, 8392). Show how this compound can be made using the indicated starting materials and any necessary reagents.



You received \_\_\_\_\_ points out of 100 points possible. To check your overall performance in lecture see <http://canvas.weber.edu>.