

Chem 112B Midterm 2

Instructor: Richmond Sarpong

March 23rd 2017

8:10-9:30 am, 100 Lewis

You have **80 minutes** to complete this exam. Please write your answers clearly only on the pages indicated *and be as detailed as possible*. Nothing written outside the numbered pages will be graded. There should be 8 total pages in this exam.

Name: KEY

UID: _____

GSI Name: _____

Question

Score

1 _____ (14 points)

2 _____ (15 points)

3 _____ (15 points)

4 _____ (17 points)

5 _____ (20 points)

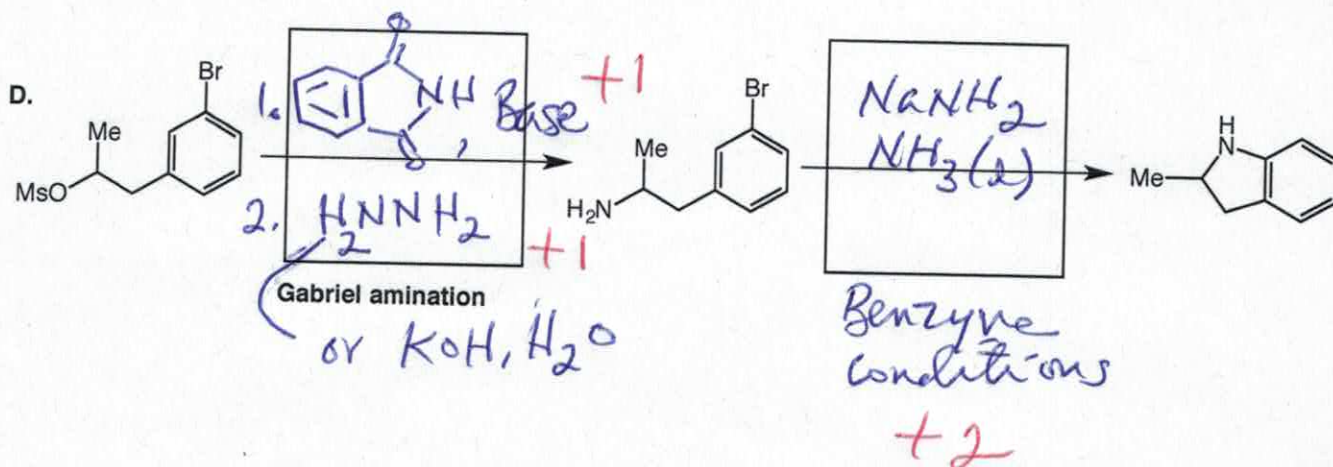
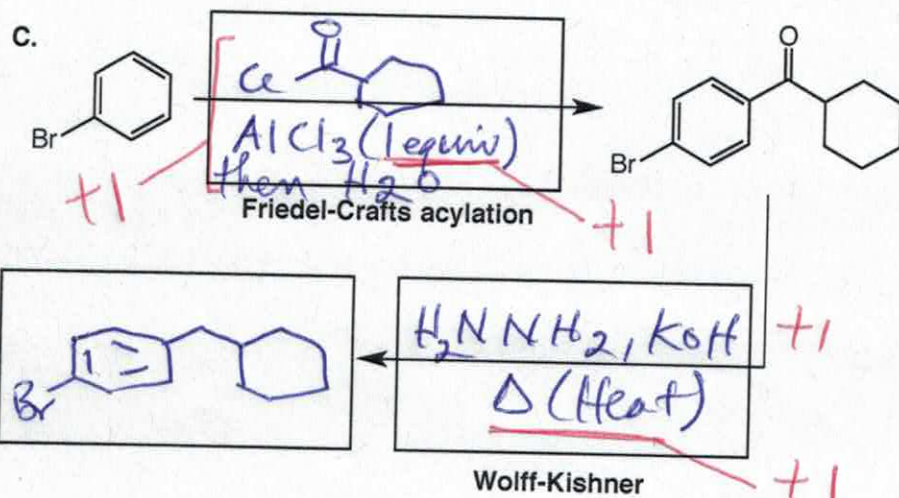
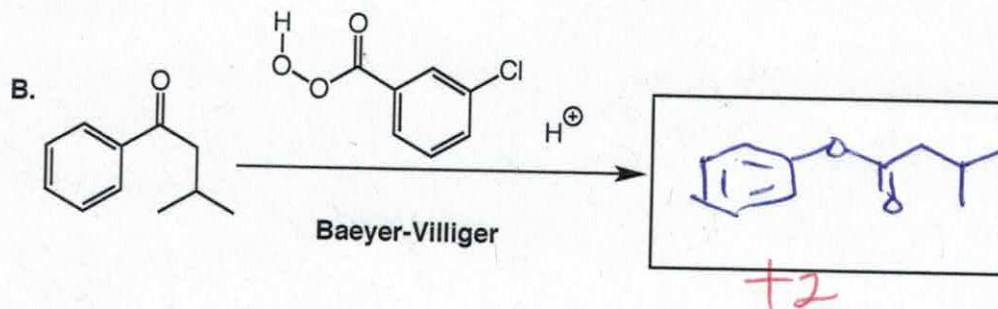
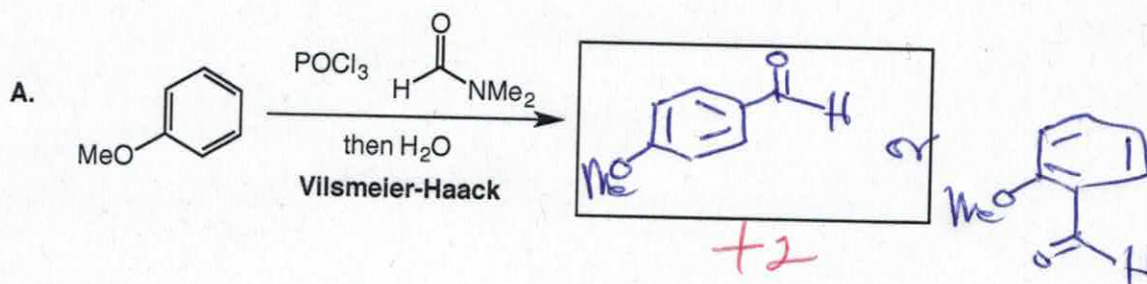
6 _____ (19 points)

Total

_____ (100)

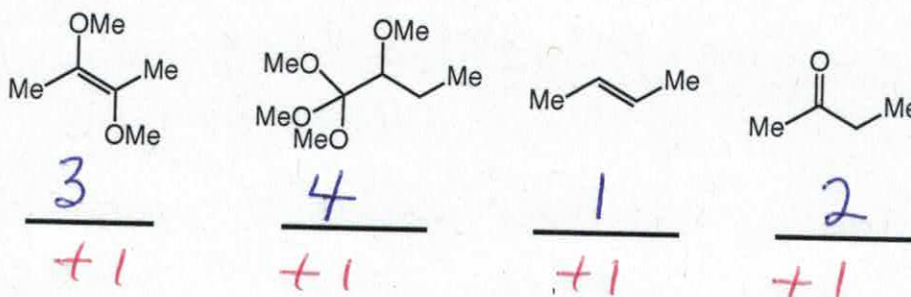
Question 1 (14 points):

Provide reagents to accomplish the transformations shown below. Note that a given transformation may require multiple steps (2 pts each; 14 pts total):

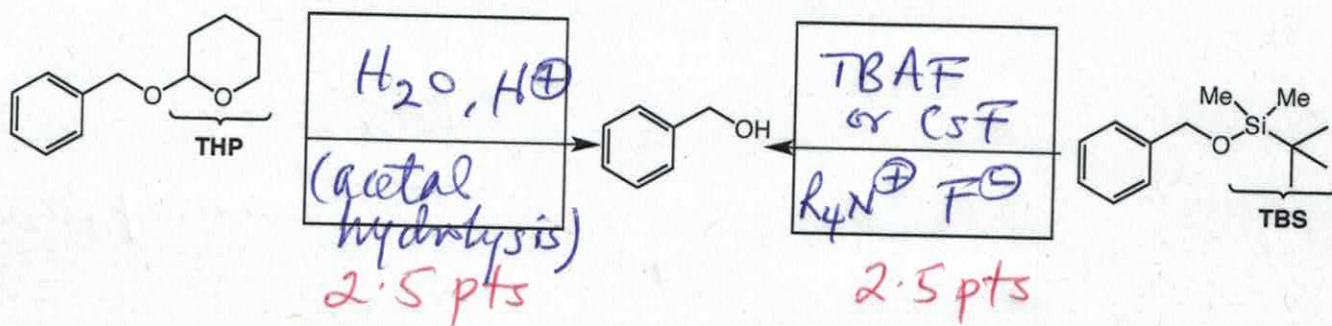


Question 2 (15 points):

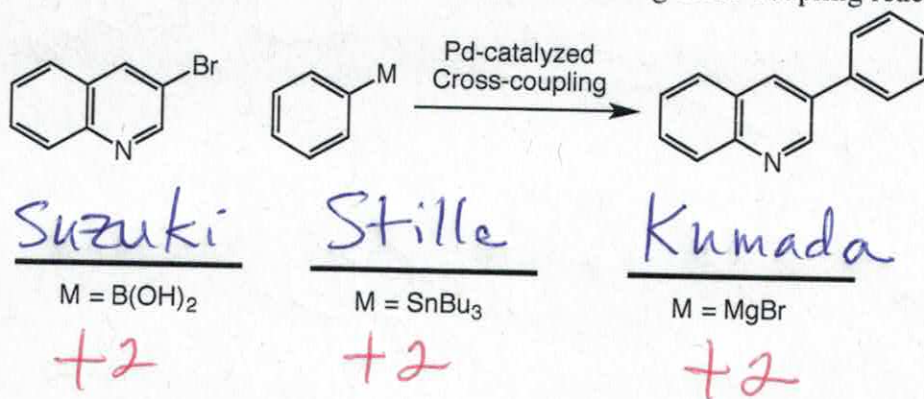
(a) Rank the following molecules (from 1 to 4) in terms of increasing oxidation level (1 for the lowest level). (4 pts total)



(b) Provide conditions for the following **deprotection** steps (i.e., removal of the protecting group). (2.5 pts each)

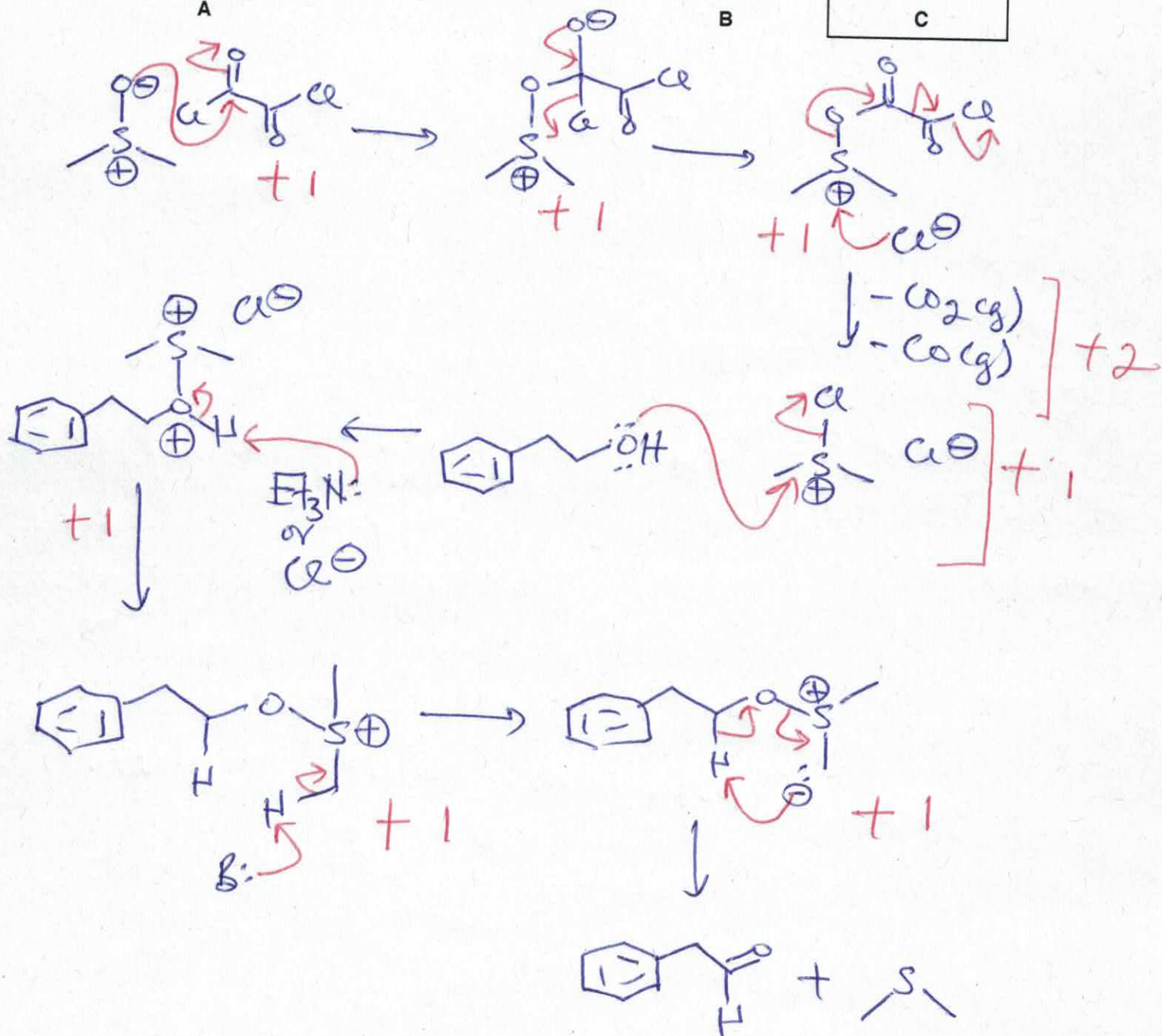
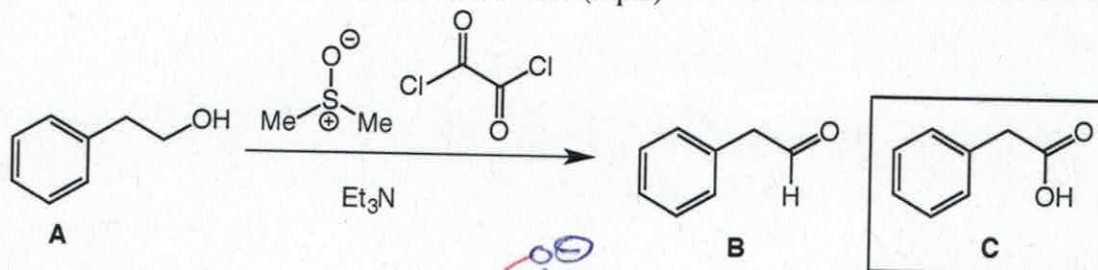


(c) Provide the names associated with the following cross-coupling reactions (6 pts)

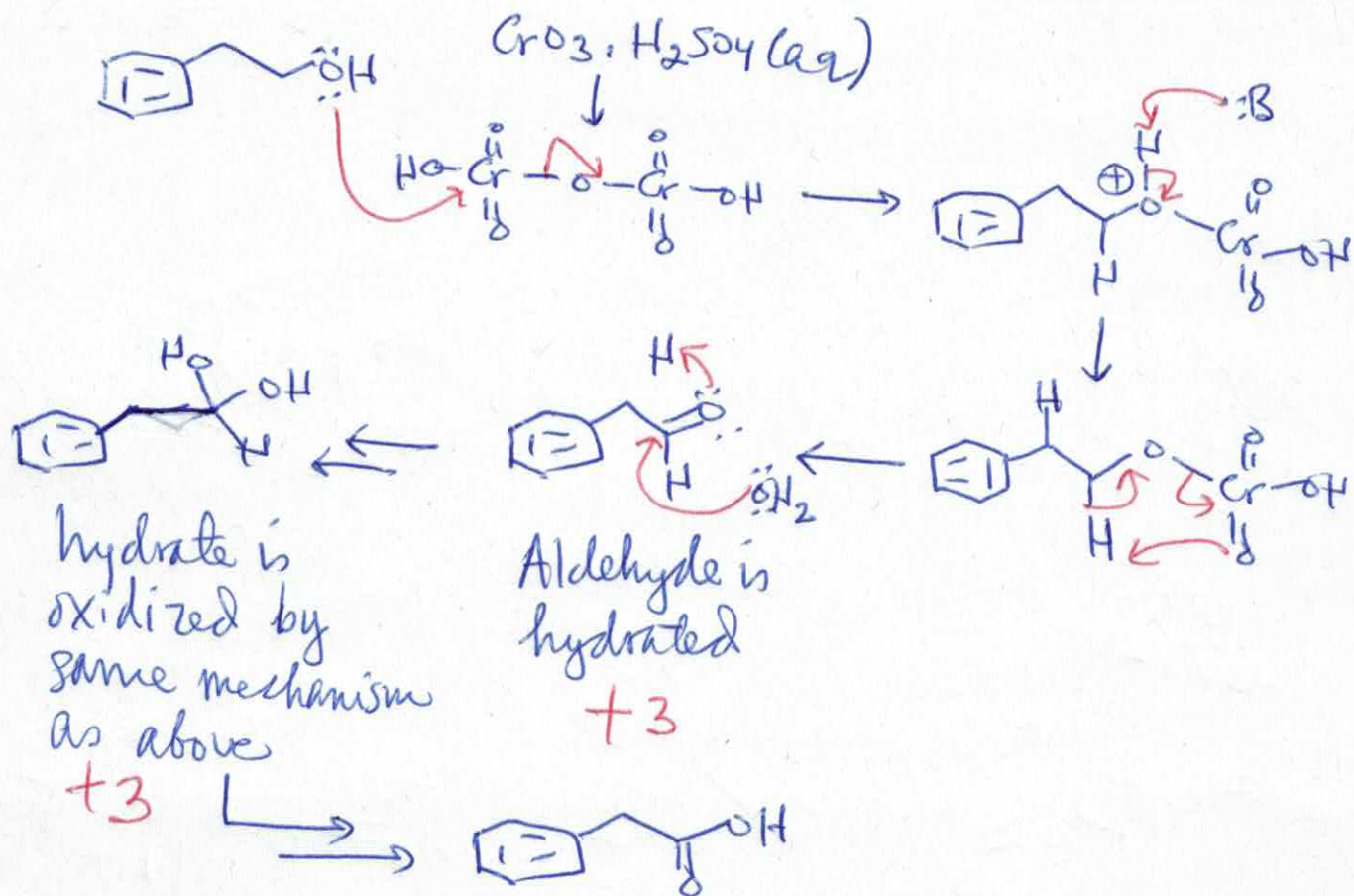


Question 3 (15 points):

(a) A Swern oxidation provides aldehyde **B** from alcohol **A** whereas a Jones oxidation provides acid **C**. Provide a detailed mechanism for the formation of **B**: (9 pts)

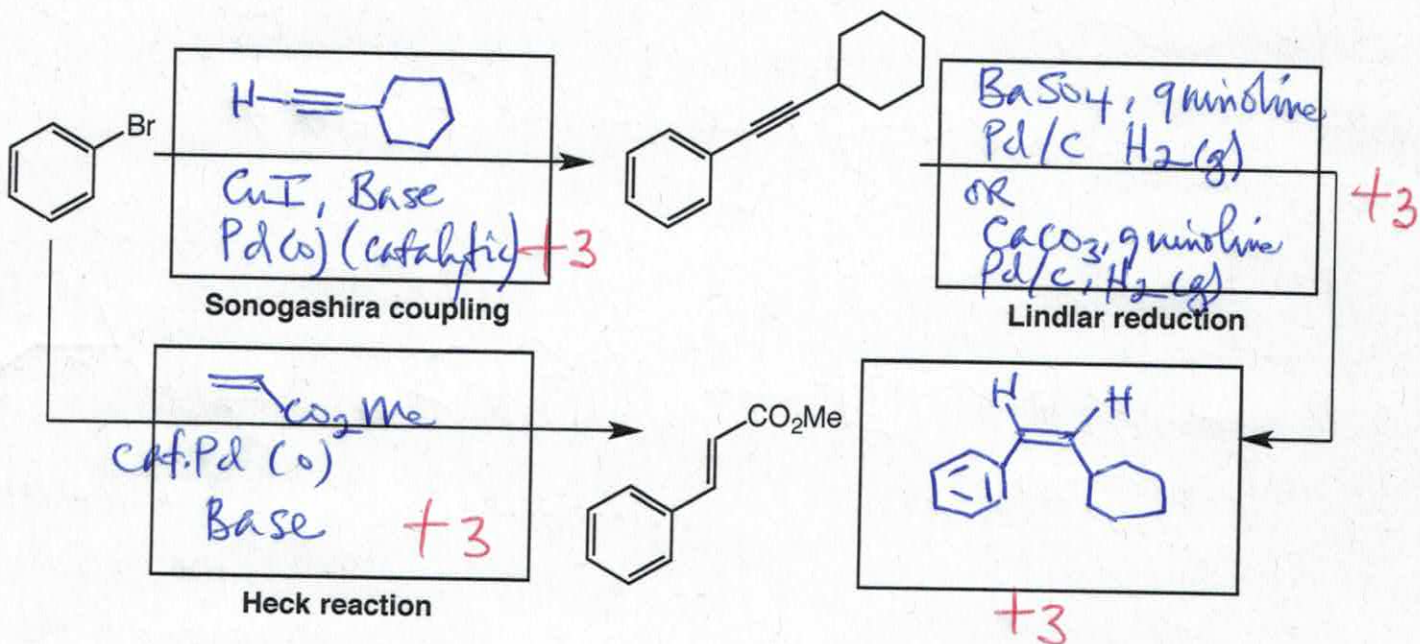


(b) Explain with a mechanism how C forms from A under the Jones oxidation conditions. In addition, you may add up to two sentences (6pts)

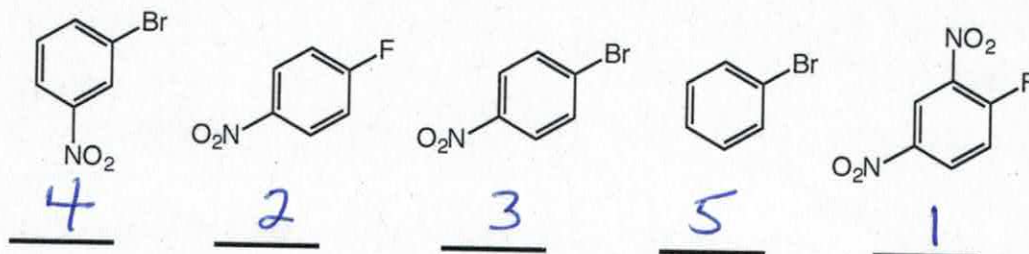


Question 4 (17 Points):

(a) Provide reagents for the following transition metal-catalyzed transformations (3 pts each; 12 pts total)

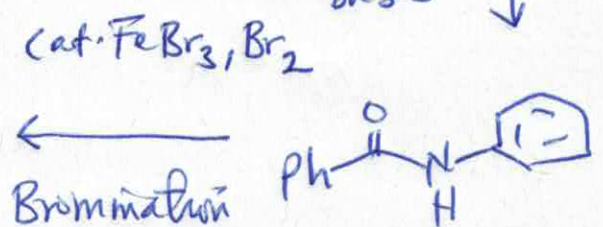
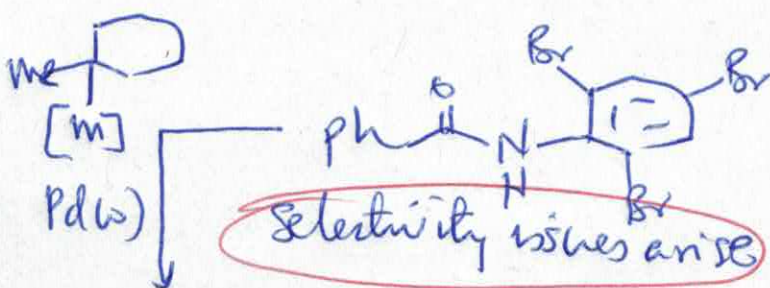
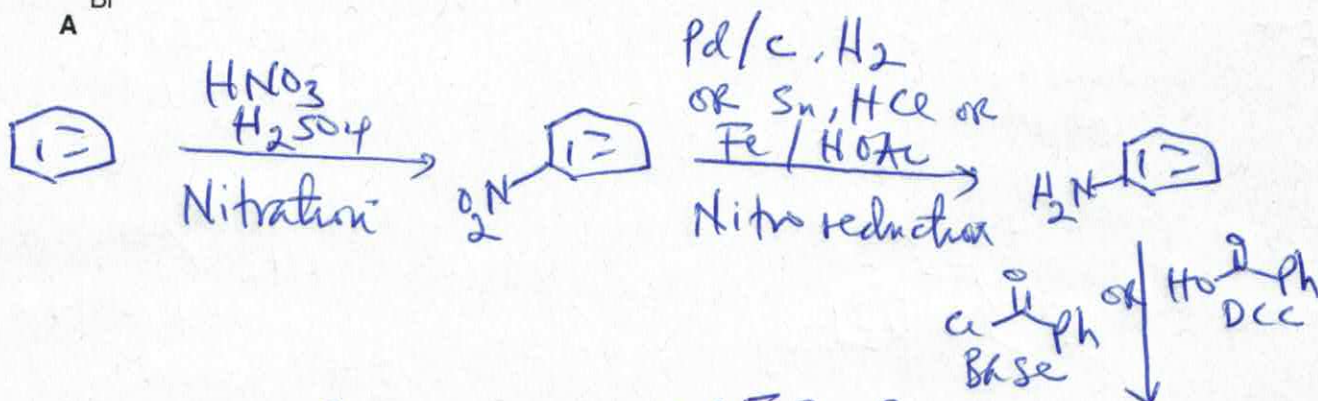
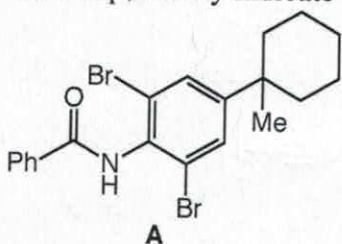


(b) Rank the following benzene derivatives from 1 to 5 in terms of rate of reaction in a S_NAr reaction with 1 being the fastest. (5pts)

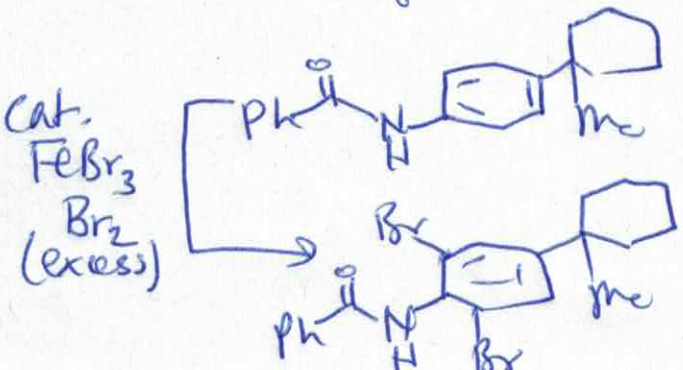
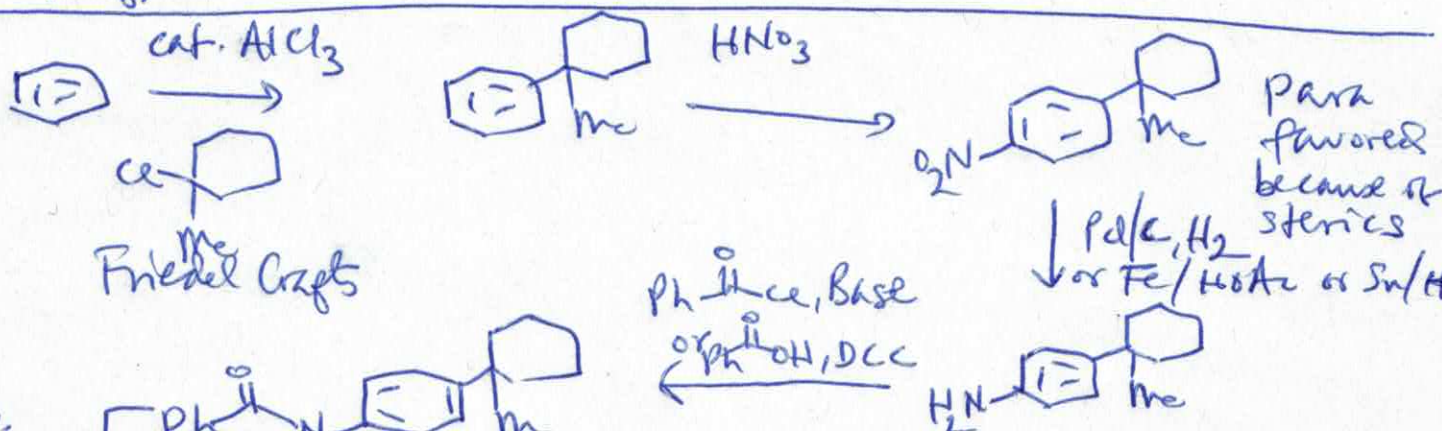
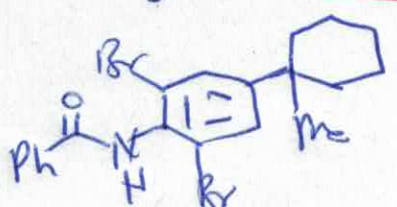


Question 5 (20 points):

Provide a synthesis of **A** (shown below) from benzene and any other reagents you deem necessary. For each step, clearly indicate the equivalents of reagents that you need.



10pts for this answer



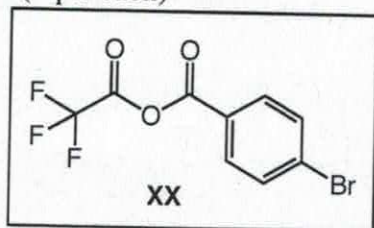
Other alternative answers may exist

+ 20 for this answer

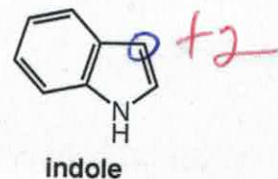
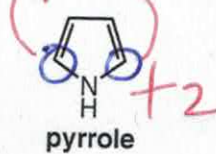
Question 6 (19 points):

Mixed anhydride **XX** (shown below) forms an acylium intermediate in the presence of a Lewis acid.

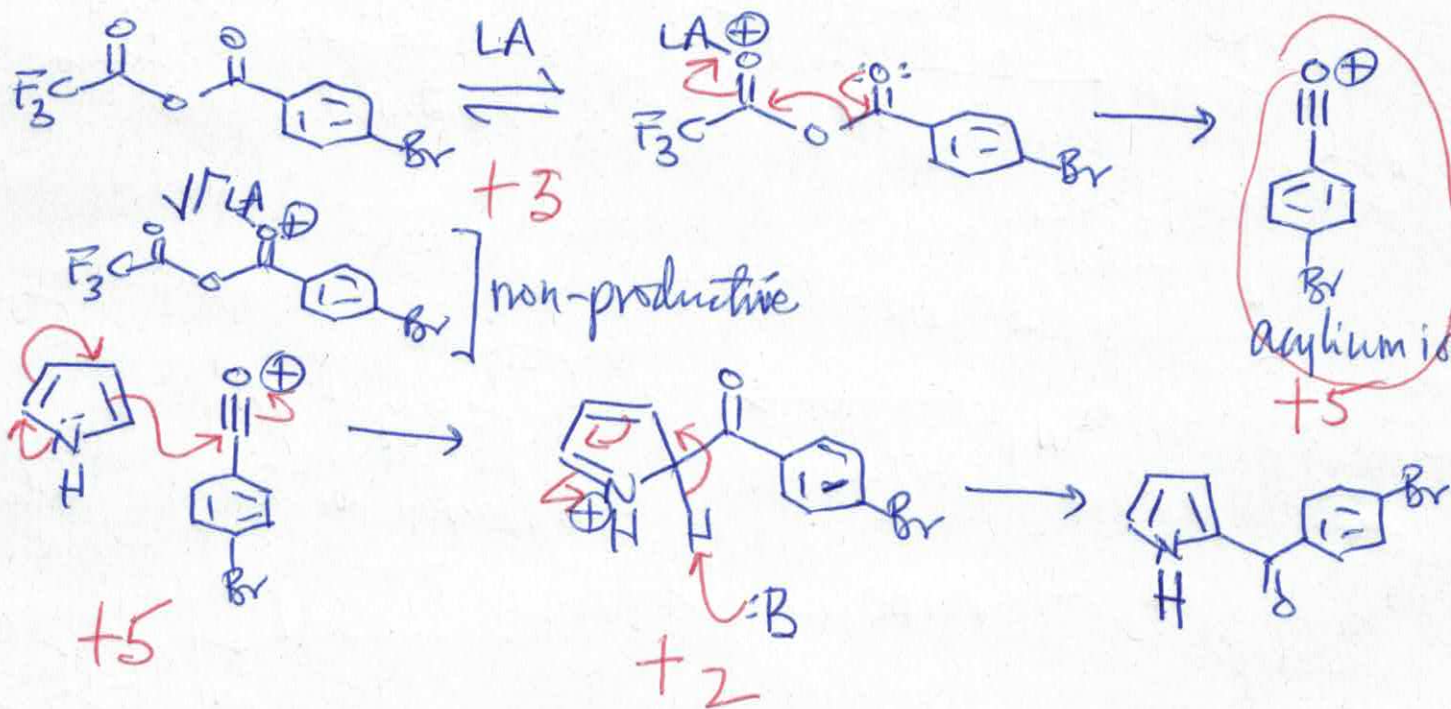
(a) Circle the positions on pyrrole and on indole that will react first with the acylium intermediate that is formed from **XX**. (2 pts each)



equivalent



(b) Provide a mechanism for the S_EAr reaction of pyrrole and **XX** in the presence of a Lewis acid (LA) (15 pts)



The End