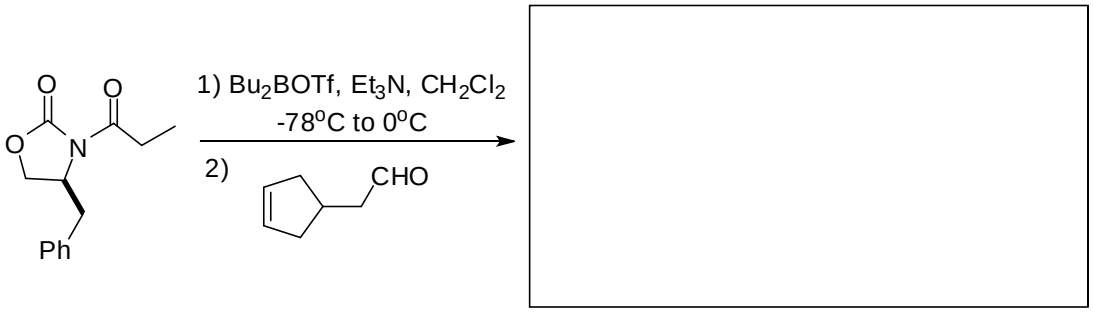
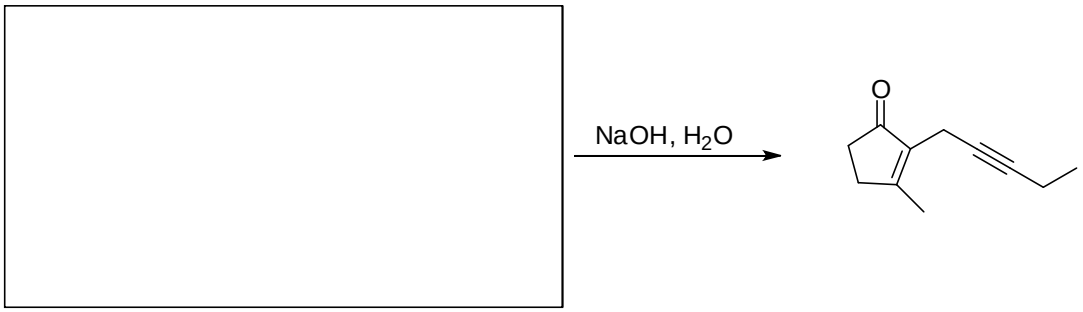
Advanced Organic Chemistry: Synthesis Name:_____
CHEM 311/511
Problem Set #2
Due: Tuesday, September 22, 2009

1. Provide the necessary information, products or reagents, to complete the following reactions. Undergraduates must complete three of the four problems and graduate students must complete all four. (4 pts.)

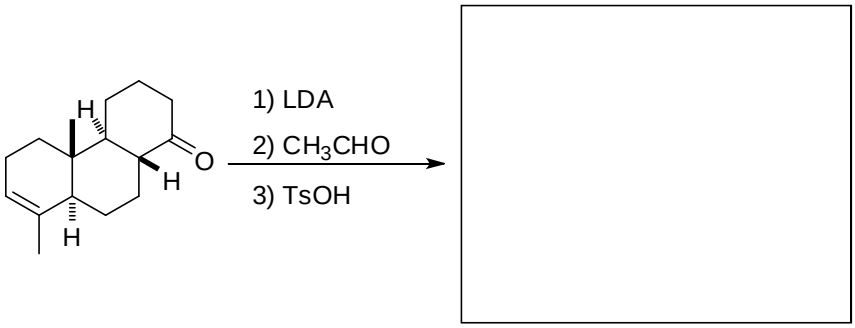
a)



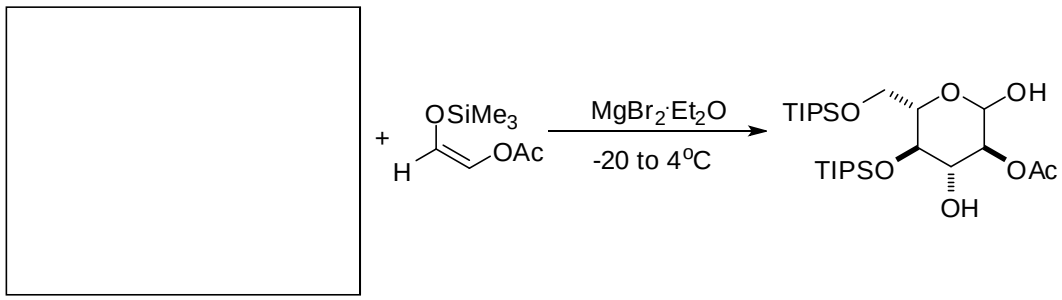
b)



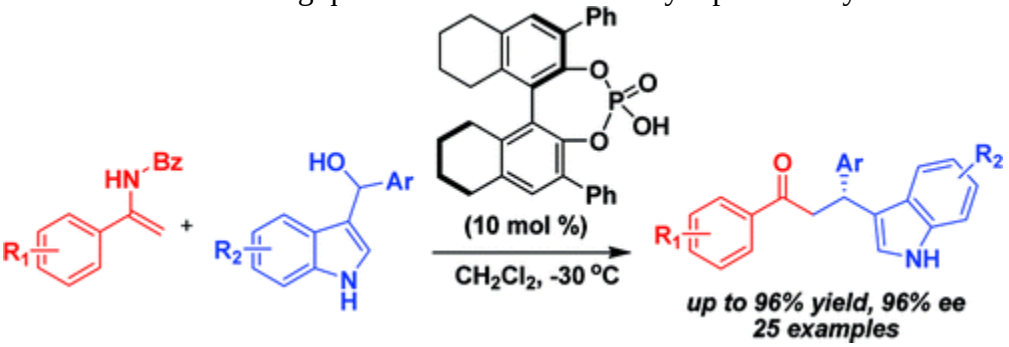
c)



d)



2. Answer the following questions about the recently reported alkylation reaction shown below. (6 pts.)



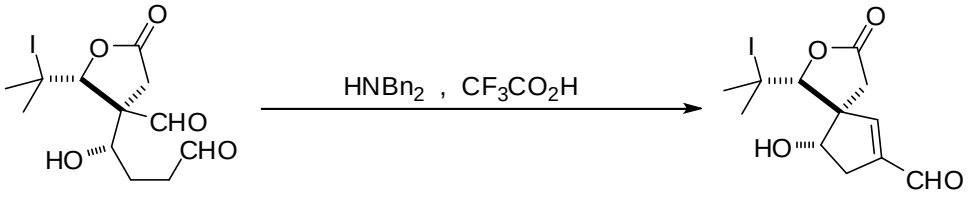
a) Identify the nucleophile (Nu) and the electrophile (E+) in the reaction.

b) Propose a mechanism for the reaction. You may ignore stereochemistry for the mechanism.

c) Both the Nu and the E+ are specialized to work in this reaction. Describe one characteristic of both the Nu and the E+ that makes them well-suited to succeed in this reaction.

d) Describe the two roles of the phosphoric acid.

3. Provide a mechanism for the following transformation. You may abbreviate structures for convenience, but be sure the necessary structural information is present. (5 pts.)



4. Natural product synthesis requires an ability to recognize key bond disconnections that can create the requisite carbon framework of a complex molecule. The molecule shown below is the macrocyclic core of the antibiotic erythromycin. It is a polyketide and therefore has a rich collection of potential aldol addition disconnections. Undergraduates must show one bond disconnection and aldol reaction, and graduate students must show two bond disconnections and aldol reactions. Your proposed aldol reactions must control stereochemistry and should afford a structure that can subsequently be incorporated into the product. (5 pts.)

erythromycin macrocyclic core