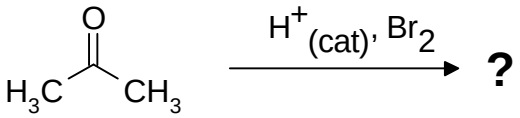
**University of Windsor**
**Department of Chemisty and Biochemistry**

**Chemistry 59-331/333** **Mar. 6, 1996**
**Second Test** **Time: 50 minutes**

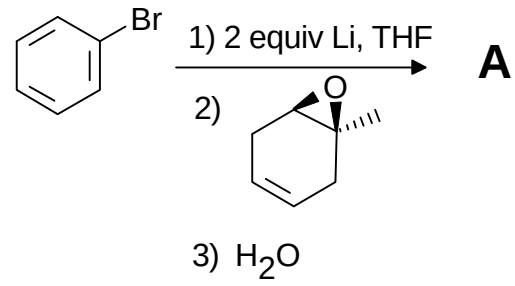
**Answer all questions in the exam booklet**

**1.** Show the mechanism of the acid catalyzed bromination of ketones (using acetone as a model). The full answer will include the steps which convert the ketone to its enol form.

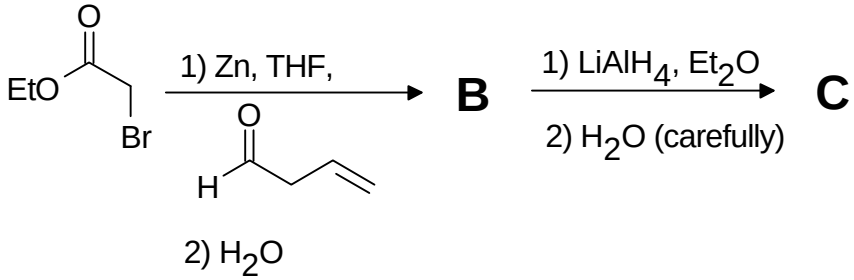



**2.** Indicate the structure of the major product from each of the following reactions. Include stereochemistry where relevant. Mechanisms are not necessary, but showing your work may be a help.

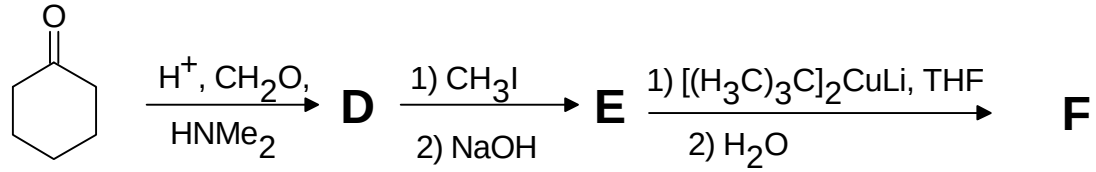
**a)**



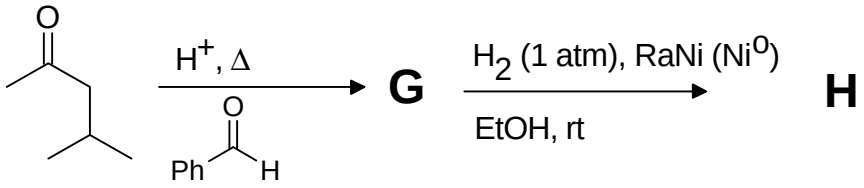

**b)**




**c)**

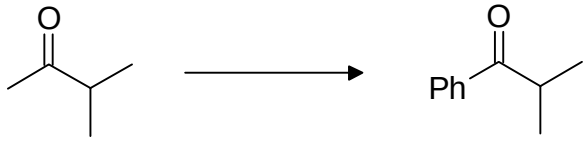



**d)**



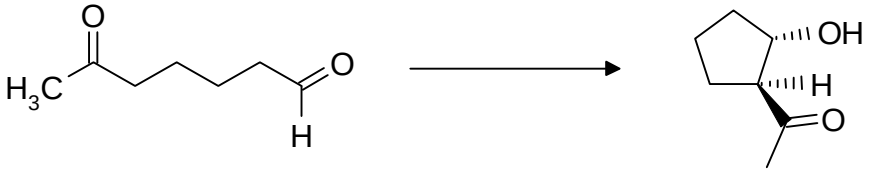

**3.** Show by equation how you could prepare the products illustrated below from the given starting materials. You may use any other reagents which you deem fit. Show all reagents, conditions, and intermediates which could be isolated. Mechanisms are not necessary, but may be a help.

**a)**

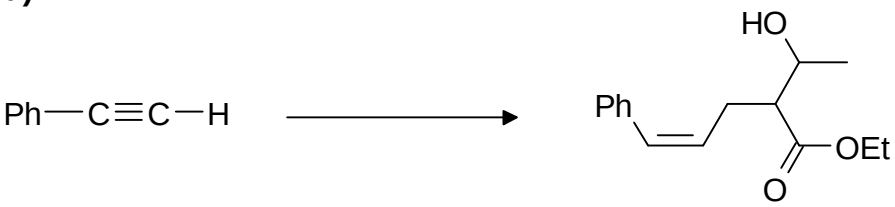



**b)**


**c)**




**d)**




**Bonus:** One method of removing a carbonyl group which gives the chemist more flexibility in functionalization is called the Shapiro reaction, which involves treatment of a tosyl hydrazone with 2 equivalents of strong base, followed by an aqueous workup. Propose a reasonable mechanism for the Shapiro reaction.