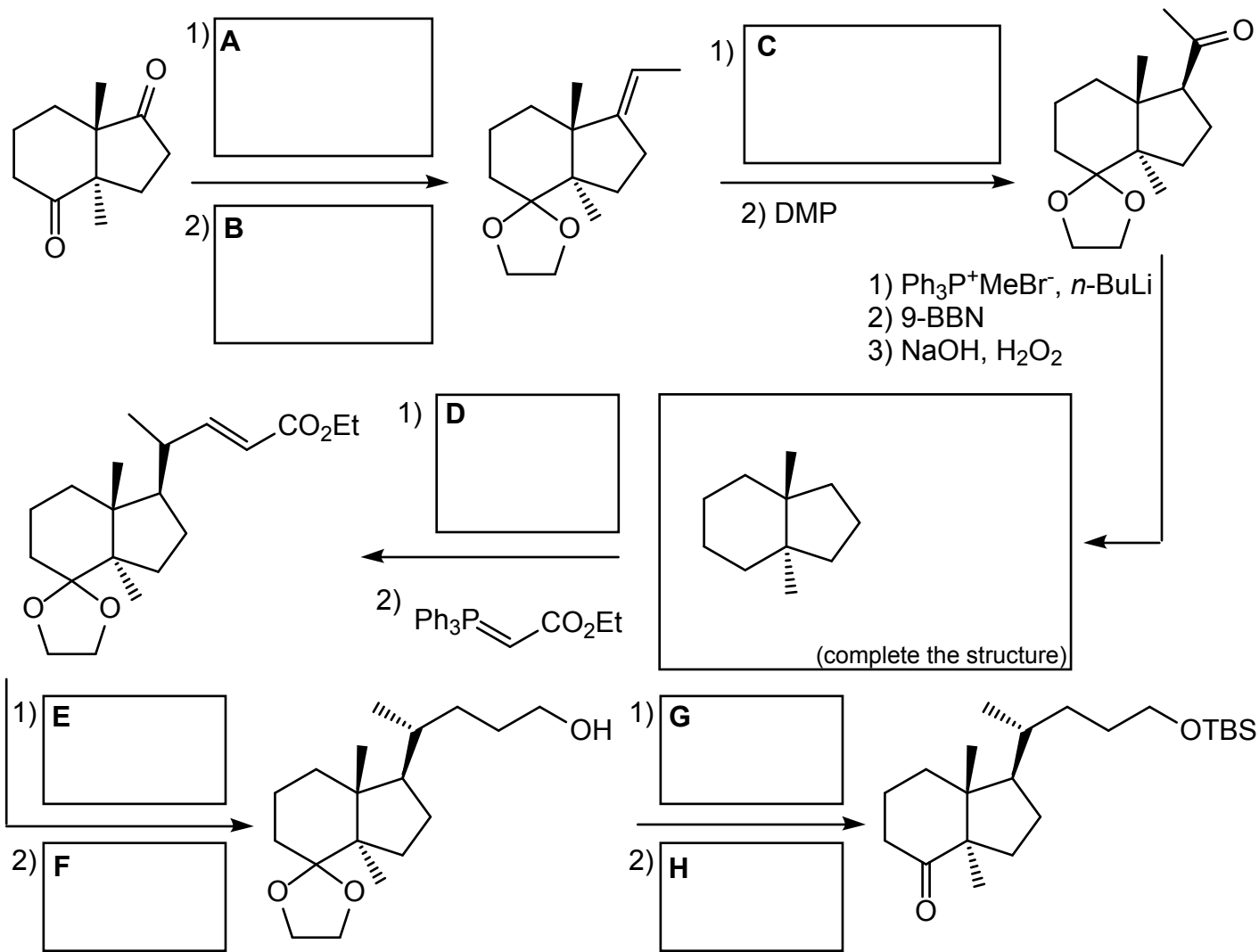


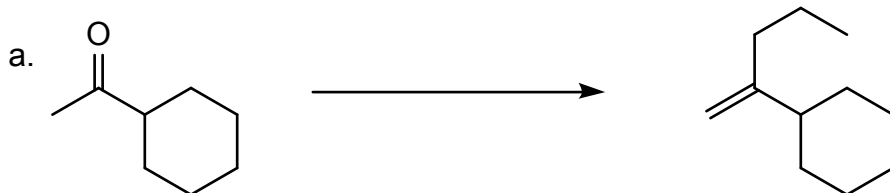
CHM 4220 Organic Synthesis, Dr. Laurie S. Starkey, Spring 2020
Midterm Exam

Name: _____

I. (20 pts) Provide the missing reagents **A–H**, and complete the drawing to provide the structure of the missing intermediate. You can ignore the stereochemistry. Each box is a single transformation (but it may be a 2-step procedure, such as a reaction with an aqueous workup).

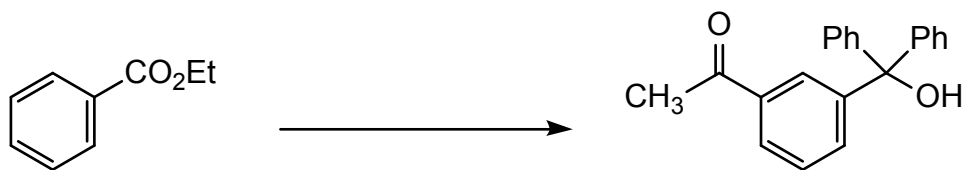


II. (48 pts, 8 points each) Provide the reagents necessary to transform the given starting material into the desired product. **Show your work, and provide at least one intermediate structure in each transformation.** It may help to first consider the retrosynthesis of the product.

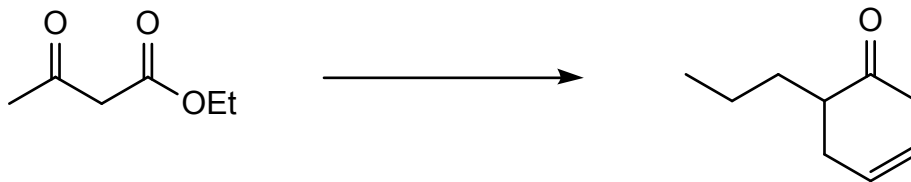


II. (cont'd) Provide the reagents necessary to transform the given starting material into the desired product. **Show your work, and provide at least one intermediate structure in each transformation.** It may help to first consider the retrosynthesis of the product.

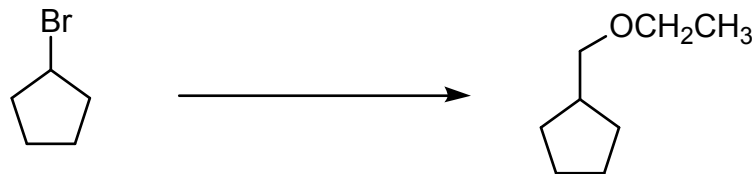
b.



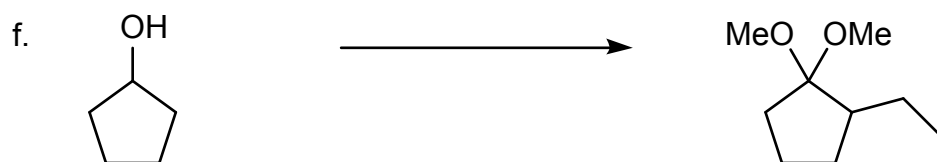
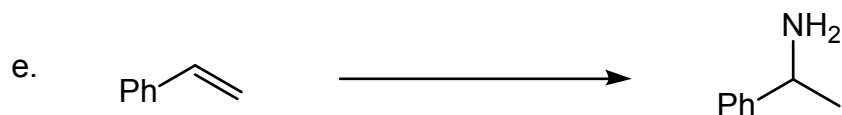
c.



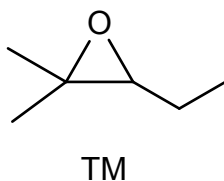
d.



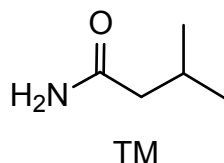
II. (cont'd) Provide the reagents necessary to transform the given starting material into the desired product. **Show your work, and provide at least one intermediate structure in each transformation.** It may help to first consider the retrosynthesis of the product.



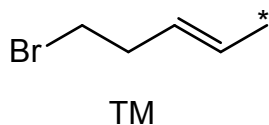
III. (12 pts) Synthesize the following TM, starting only with **alcohols** as your sources of carbon. You may use any other commercially available reagents as necessary. The synthesis must involve the **formation of a new C–C bond**.



IV. (10 pts) Provide a synthesis for the following target molecule (TM). The synthesis must involve the **formation of a new C–C bond** and may use any commercially available reagents.



V. (10 pts) Provide a synthesis for the following target molecule (TM) that correctly incorporates the ^{14}C -labeled (*) carbon atoms as shown, using the given starting materials as the only sources of carbon. Any commercially available reagents may also be used.



available starting materials
(sources of carbon):

