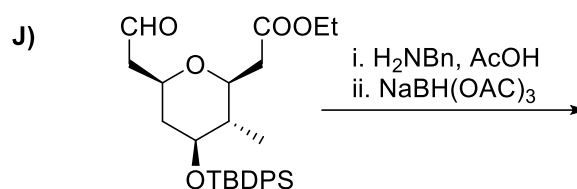
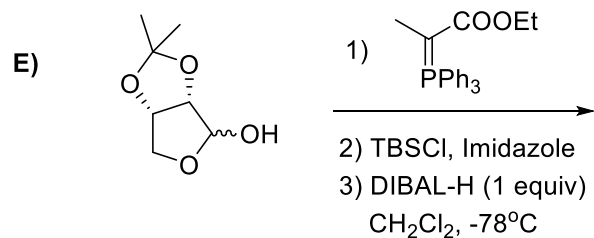
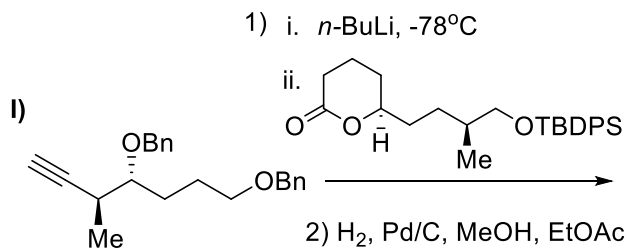
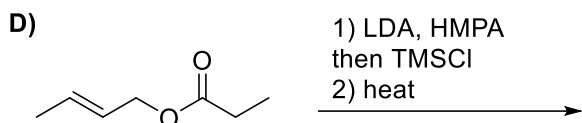
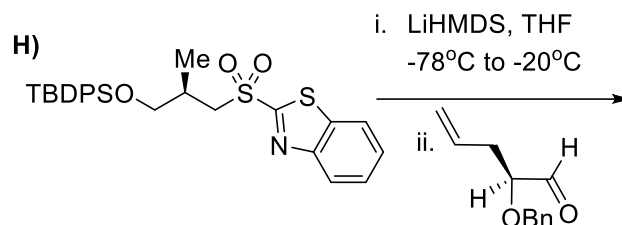
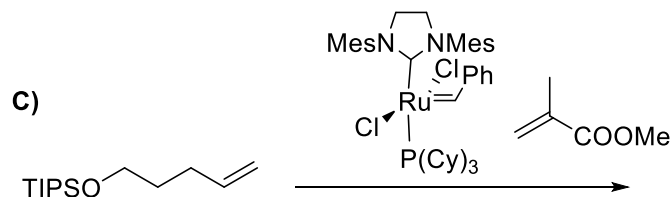
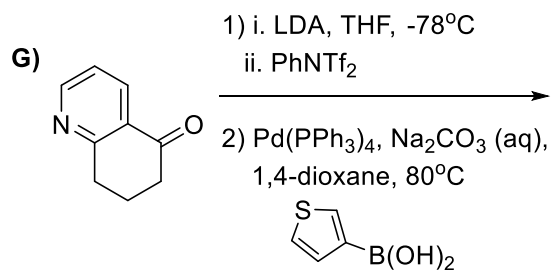
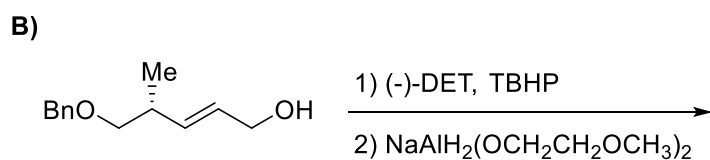
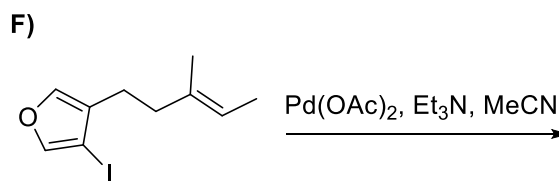
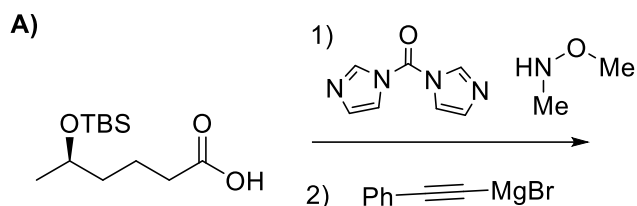


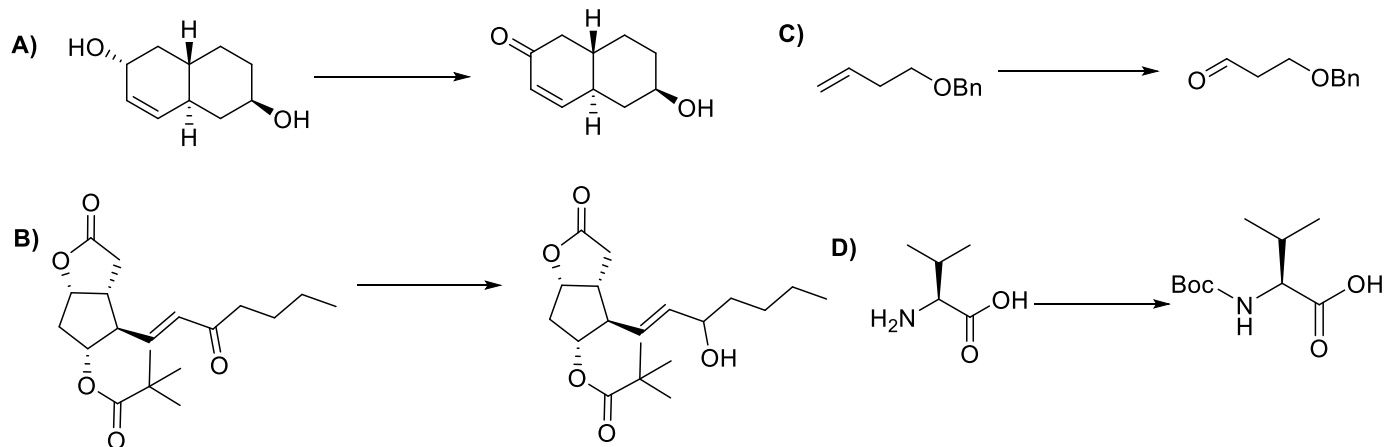
Organic Chemistry Cumulative Examination  
3 March 2016

Total: **230 points**

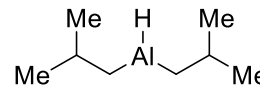
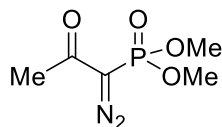
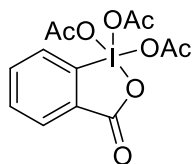
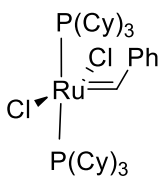
1) **Give the products** of the following reactions and **draw any isolable intermediates**. Carefully indicate stereochemistry where appropriate (**50 points**).



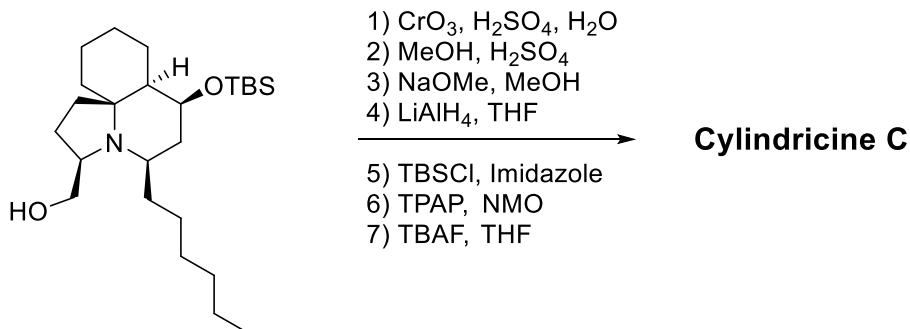
2) Provide reaction conditions to selectively effect the following transformations (20 points).



3) The following reagents are very useful for organic synthesis. For each reagent, give its common name (e.g. Wilkinson's catalyst) and an example of the reagent's use. Select a substrate of your choice to illustrate each transformation (20 points).

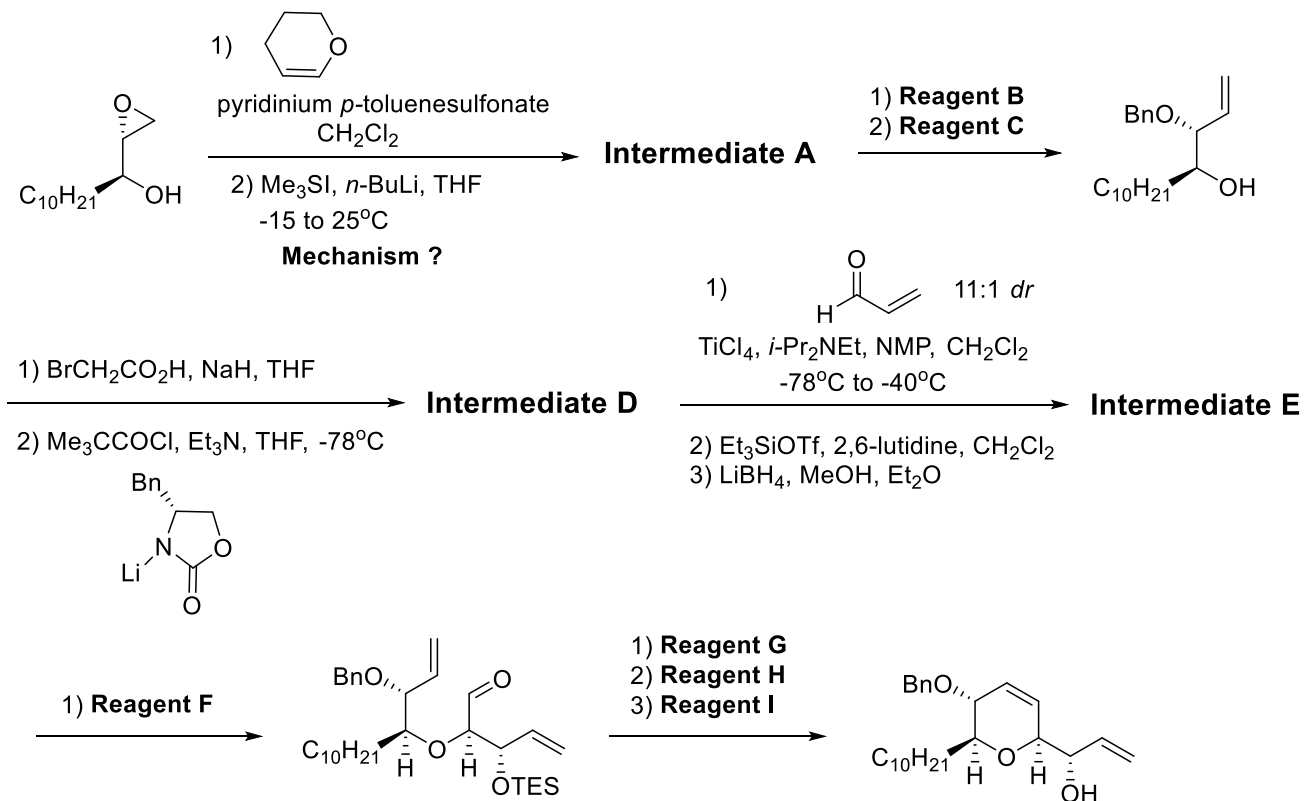


4) In the following synthetic route, draw all isolable intermediates (21 points).



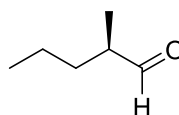
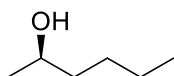
Explain why only one stereoisomer is isolated following this series of synthetic transformations (4 points)

5) In the following synthetic route, **provide the missing reagents, intermediates, and mechanisms** as indicated (40 points).

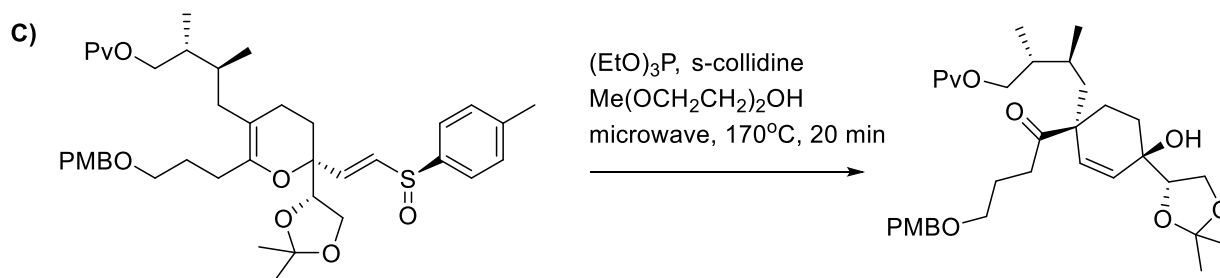
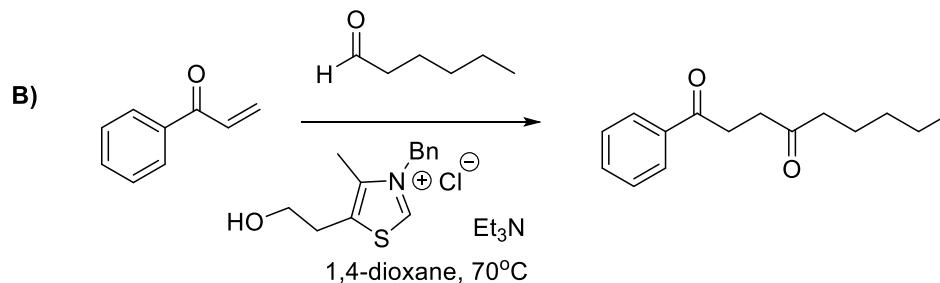
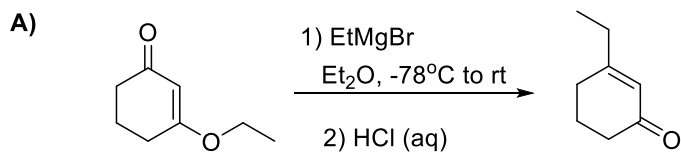


Explain the observed stereochemical outcome in the transformation of Intermediate D to Intermediate E using appropriate transition state models (5 points)

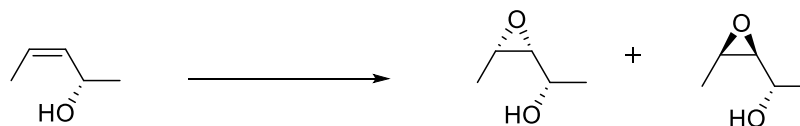
6) Propose a synthesis of the following compounds starting from achiral starting materials. You may use chiral auxiliaries or kinetic resolution, but you must explain how these methods facilitate the desired transformations using Newman projections, stereochemical models, and/or transition state analysis (20 points).



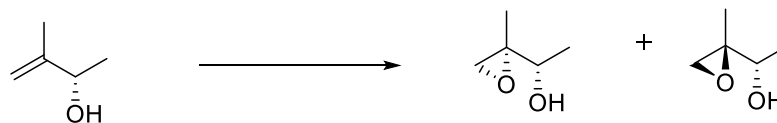
7) Provide a reasonable mechanism for the following transformations (30 points).



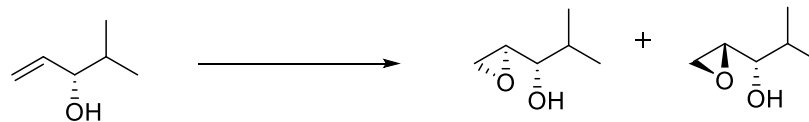
8) Rationalize the formation of the products depicted below using Newman projections, stereochemical models, transition state analysis, etc. (20 points).



*m*-CPBA  
VO(acac)<sub>2</sub>, TBHP  
95 : 5  
71 : 29



*m*-CPBA  
VO(acac)<sub>2</sub>, TBHP  
45 : 52  
5 : 95



*m*-CPBA  
VO(acac)<sub>2</sub>, TBHP  
58 : 42  
15 : 85