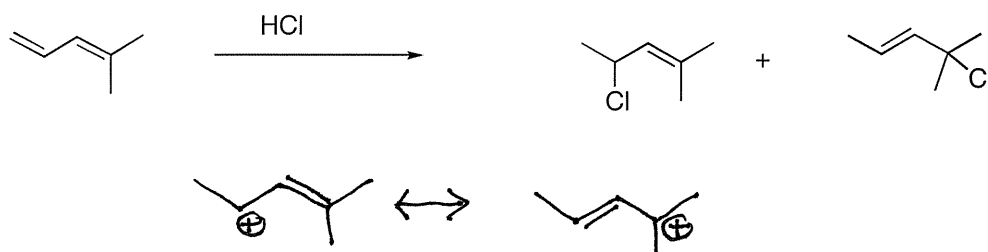
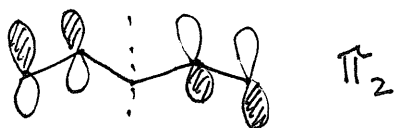


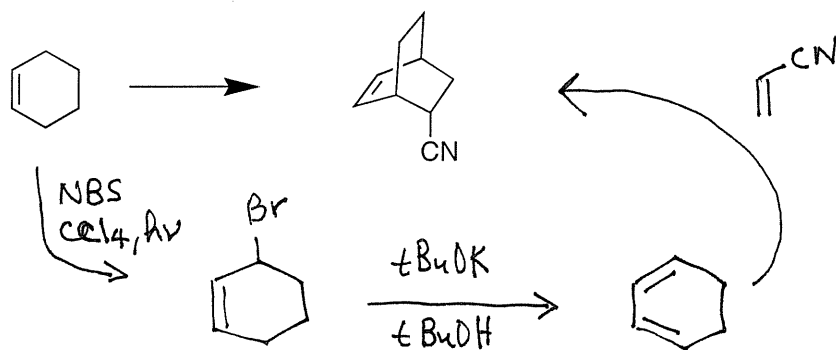
(1) (1 pt) Write the structure (including any important resonance forms) of the reaction intermediate for the conversion below.



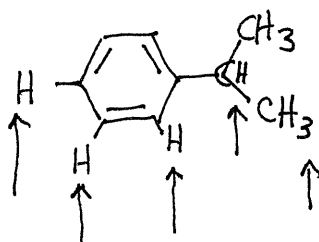
(2) (1 pt) Sketch the HOMO of pentadienyl cation



(3) (2 pts) Provide a reaction sequence to accomplish the following synthesis.



(4) (1 pt) Write the structure of cumene and give the number of  $^1\text{H-NMR}$  signals expected (assuming no signal overlap).



5  $^1\text{H-NMR}$  signals