

**In-Class Exercise:  
Planning Multistep Organic Syntheses**

Chemists specializing in organic synthesis plot routes to make complex molecules from simple starting materials, using their knowledge of organic transformations to get from molecule "A" to molecule "B". We have now discussed three general organic transformations: substitution, elimination, and radical halogenation. Pretend that you are a synthetic organic chemist at a chemical company, and that you need to transform each of the starting materials below into the given products. How would you do it? Propose a multistep synthesis for each, giving a recipe of reagents and reaction conditions for each synthetic step.

*Note:* You do not need to "push electrons"—this is not a mechanism question.

