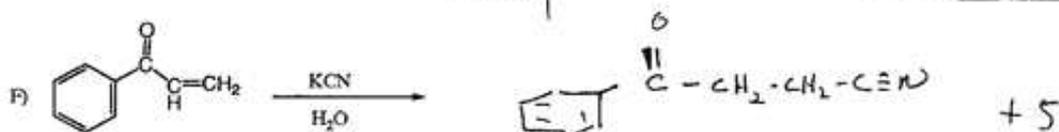
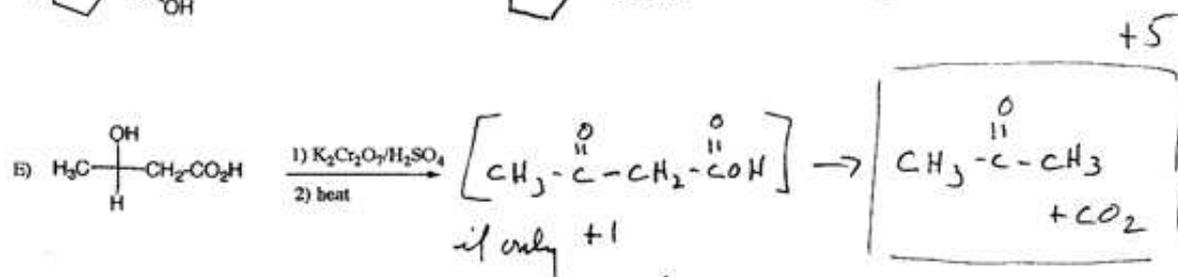
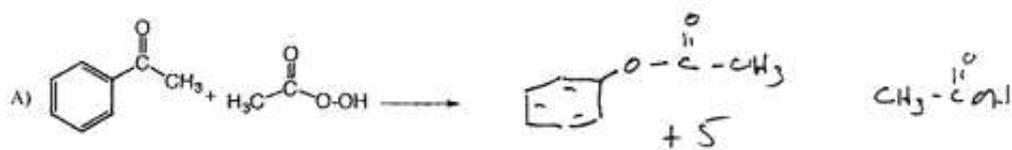
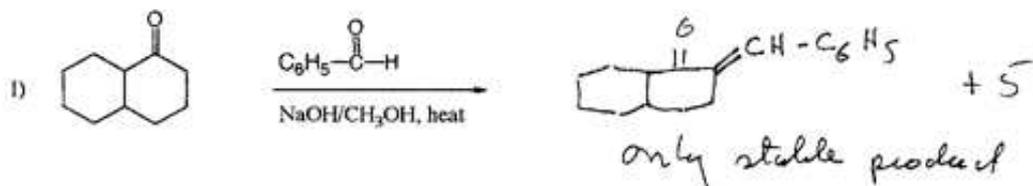
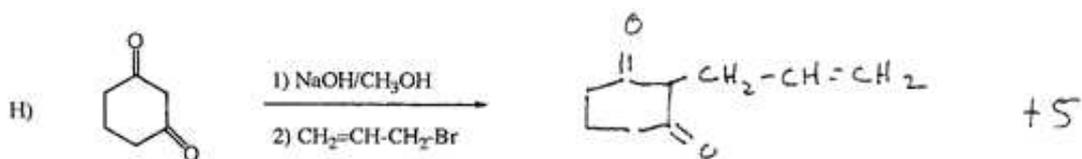
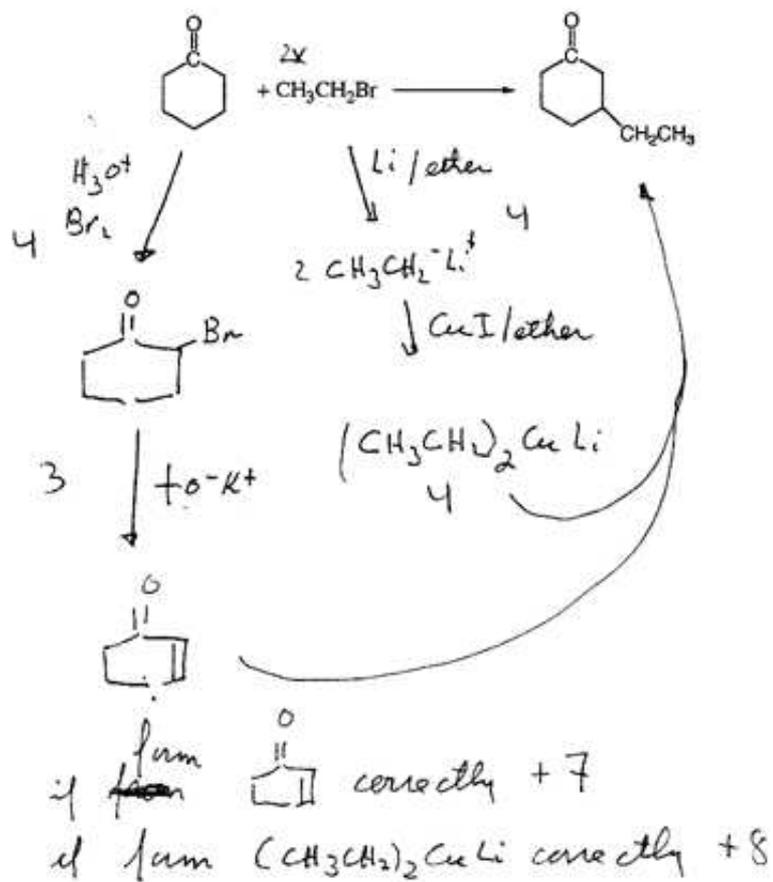


Problem 1 (45 points). Give **only** the major product for the following reactions. **Circle your answer.** If there is more than one step given only the final product. If no reaction, state so.

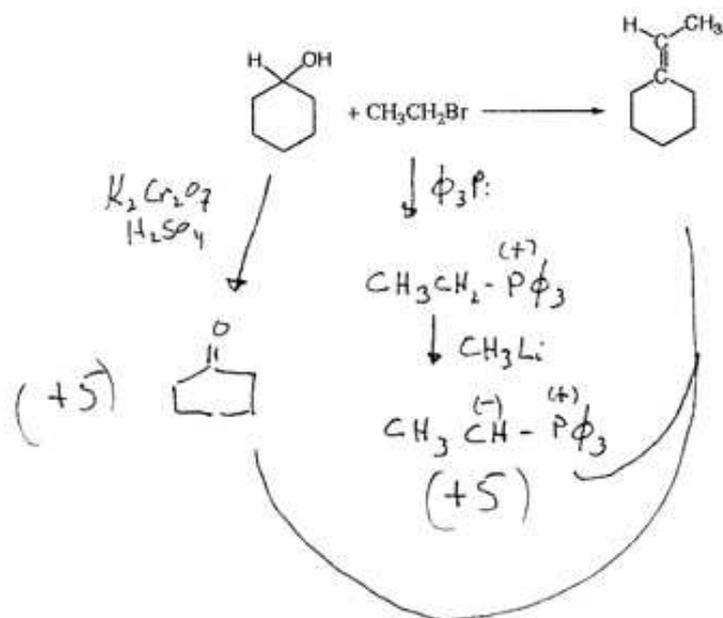




Problem 2. (15 points) How would you carry out the following transformation using the indicated starting materials and any other reagents. You can use as much of any material as you would like. Use only reactions that are high yield!



Problem 3. (10 points) How would you carry out the following transformation using the indicated starting materials and any other reagents. You can use as much of any material as you would like. **Do not use Grignard or alkyl lithium reagents!**



Problem 4. (10 points) What two molecules would you start with to carry out the synthesis of the following molecule using the Robinson annulation. **Do not show the synthesis, just the two molecules.**

