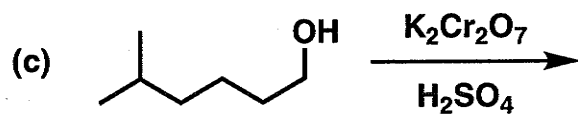
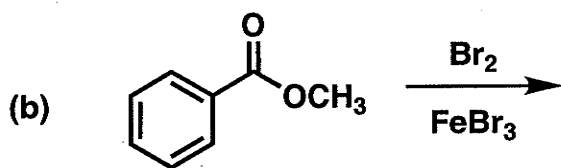
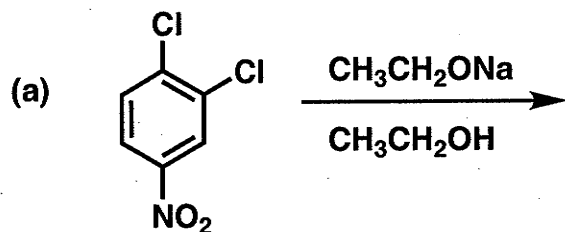


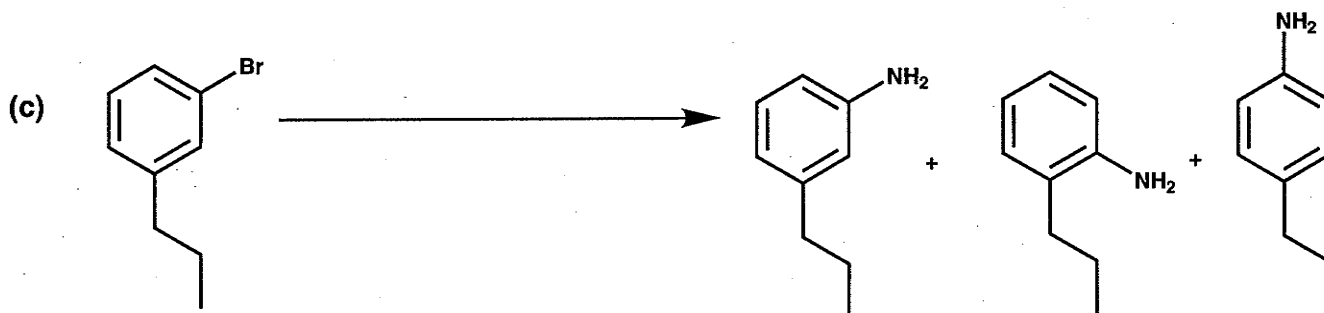
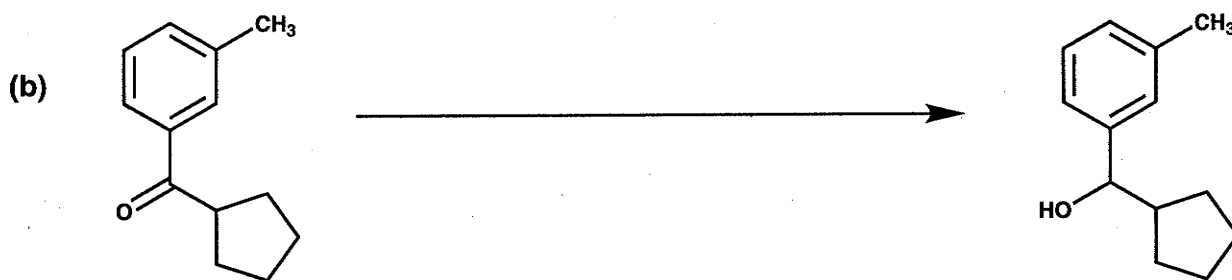
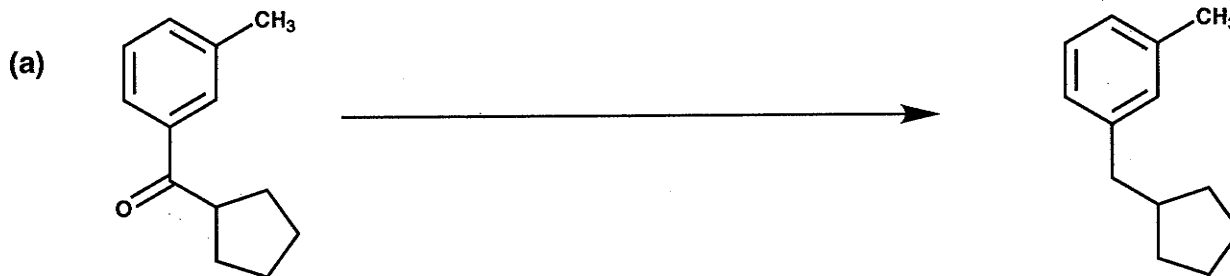
**General Instructions:**

- (i) Use scratch paper at back of exam to work out answers; final answers must be recorded at the proper place on the exam itself for credit.
- (ii) Print your name on each page.

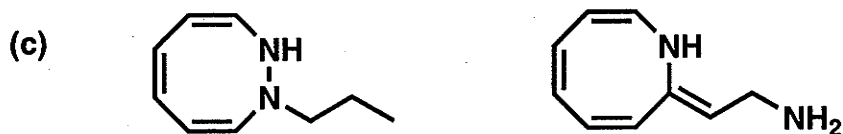
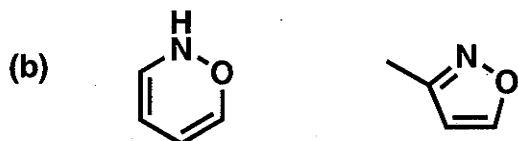
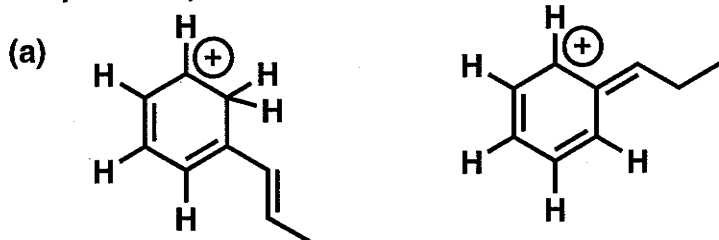
1. (18 points) Show the major product or products expected from each reaction:



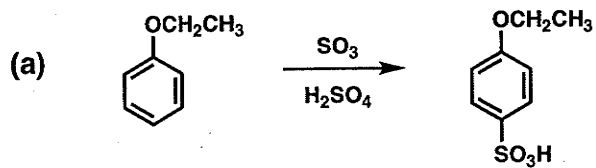
2) (19 points) Show the reagents and other organic molecules required to convert the starting molecule into the indicated product. Be sure to differentiate clearly between distinct steps, by using "1)," "2)," etc. over the arrow. Use the minimum number of reactions.



3. (24 points) For each pair of isomers below, CIRCLE the one you expect to be more stable. Briefly explain your reasoning (use drawings to make your explanation succinct, when possible).

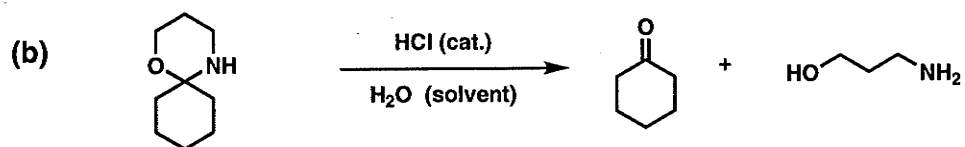


4. (27 points) Draw out a mechanism ("curved arrows") for formation of each reaction shown below. Be sure to show all important resonance structures in intermediates.

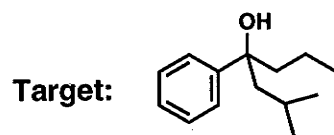


Name \_\_\_\_\_

## 4. (cont.)



5. (12 points) Propose a synthesis of the target molecule from benzene and any other organic starting materials containing  $\leq 4$  carbon atoms. Try to identify a route that has as few steps as possible.



<u>Problem #</u>	<u>Score</u>
1	/ 18
2	/ 19
3	/ 24
4	/ 27
5	/ 12

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**Total:**

**/ 100**





