**Special Topics in Fine Chemicals 2008 Final Exam Student ID # Name**

*Total 150 points. Write your answers in the space provided. If you need more space, write on the back.*

1. Answer the questions related to the following reaction between the dianion **A** and the aryl halide **B**.



(a) (5 points) Suggest a reaction to produce the dianion A. You can use any precursors but the procedure to give A should be efficient.

(b) (10 points) Write down a stepwise mechanism for the substitution reaction when X = Br and Y = H.

(c) (8 points) Do you expect the same product when both X and Y are Br? Explain your answer. If your answer is ‘no’, predict the expected product.

(d) (7 points) Propose one alternative pathway to give the same product C (Y = H) from any starting materials. It may involve more than one step.

2. (20 points) Provide a catalytic cycle mechanism for the following reaction. What is this reaction called? Indicate clearly the cyclic nature of the reaction mechanism for the full credit.



3. (30 points) Rationalize each of the following reaction products based on the reaction mechanisms.





4. (15 points x 2) Provide the structure of the reaction intermediate in each step of the following reactions to yield the product shown. It is not required to show the stepwise reaction mechanism. Specify the stereochemistry in the final product, too.





5. (5 points x 8) Write the structure of the major products for the following reactions. Please pay attention to the regio- and stereoselectivity results in the products where appropriate.















