1. This part of the exam is take-home, open-book, and open-notes. You may use any class materials at your disposal in preparing your answers.

2. You may not communicate in any way with anyone other than the instructor about the exam or the questions. It is to be done strictly on an individual basis.

3. The exam is due by noon on Monday, May 16.

4. These problems do not require difficult or tricky algebra. The solutions are not long or messy. They follow the methods that you have used repeatedly in the homework problems. My solution to each problem fits on one page, including all intermediate steps. You will probably be able to work out the basic solutions to each problem in an hour or two if you understand what you did on the homework projects. If you are completely stuck, come and talk to me; I may be able to nudge you in the right direction, though I will not be as helpful as on the homework.

5. You are responsible for making sure that you understand each question clearly. In case of any ambiguity, be sure to consult the instructor.

1. Varying menu costs. Consider a variation on Romer's Problem 6.7 in which there are two kinds of firms: a fraction β with low menu costs of Z_1 and the remainder $(1 - \beta)$ with higher menu costs of Z_2. Low-cost and high-cost firms produce the same output, so the average log-price that is relevant for each kind of firm is p, the average across all firms. All other aspects of the firm and the economy are as in Problem 6.7. You may assume that $\phi < 1$.

   a. For given Z_1, calculate the ranges of $|m|$ for which a low-menu-cost firm adjusts its price (i) if no other firms adjust their prices, (ii) if other low-cost firms adjust their prices but high-cost firms do not, and (iii) if both other low-cost firms and high-cost firms adjust prices.

   b. For given Z_2, calculate the ranges of $|m|$ for which a high-menu-cost firm adjusts its price (i) if no other firms adjust their prices, (ii) if low-cost firms adjust their prices but other high-cost firms do not, and (iii) if both low-cost firms and other high-cost firms adjust prices.

   c. Use the formulas you derived in parts a and b to calculate the threshold values for $|m|$ when $Z_1 = 0.01$, $Z_2 = 0.04$, $K = 1$, $\phi = 0.2$, and $\beta = 0.75$.

   d. There are three possible "symmetric" equilibria in this model: (N) no one adjusts price, (P) low-cost firms adjust price but high-cost firms do not, (F) all firms adjust price. For each of the following values of m, use the results from part c to show which of the three equilibria could occur. Multiple equilibria may be possible for some values of m. Explain the logic of each result in terms of the decisions made by low-cost and high-cost firms.

      i. $m = 0.05$

ii. $m = 0.15$
iii. $m = 0.3$
iv. $m = 0.45$
v. $m = 0.6$
vi. $m = 1.5$

2. Housing markets. Work Romer's Problem 8.7, parts (a) through (d) only. Then add the following part (e):

    e. From the mid-1990s until 2007, the housing market in the United States boomed, fueled by easily accessible "sub-prime" mortgage loans and optimistic expectations about future housing prices. This "bubble" burst in 2007 and 2008 sending house prices tumbling, mortgages into default, and financial institutions into effective bankruptcy. Can this model (or a simple variant) be used to examine this phenomenon? If so, perform the analysis and explain what the model predicts for the future of housing prices. If not, explain why not and propose how you might construct an alternative model that could be used to analyze the housing market during this period.