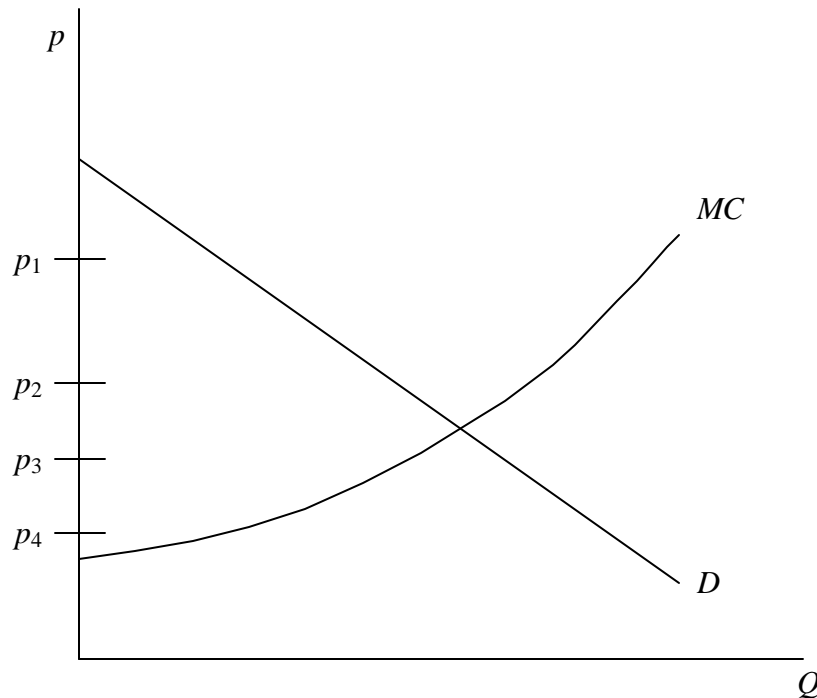# Problem Set 5
Imperfect Competition

1. The graph below shows the marginal cost curve for producing a good in a country, together with the domestic demand curve for that good.

   a. If this were a competitive industry in a closed economy, what would be the price of the good and the quantity produced?

   b. If instead there is only a single firm in the country able to produce this good, and this is that firm's marginal cost curve, what will be the price and quantity of the good produced in autarky?

   c. Suppose now that the country becomes open to free international trade at a fixed world price equal to p_1 in the figure, at which the firm can sell all it wants to and at which buyers can also buy all they want to. How much will the firm produce and sell, both domestically and internationally? How much will buyers buy, and from whom? How much of the good will the country export and/or import?

   d. Repeat part (c) for each of the prices p_2, p_3, and p_4.

   e. Repeat parts (c) and (d) assuming that imports are prohibited, but exports are permitted.

2. In class we saw the following result for the gains from trade in the Reciprocal
   Dumping Model of international Cournot duopoly:
   $$\Delta W^W = \frac{(a-c)^2}{72b}(\boldsymbol{a}-1)(11\boldsymbol{a}-5)$$
   where a and b are the parameters of the demand curve, $p=a-bQ$, c is the constant
   marginal cost of production, common to both firms, W^W is the combined consumer
   surplus and profit of both firms from sales in the domestic market, and $\boldsymbol{a} = 2t/(a-c)$
   where t is the transport cost.

   a. For a given value of the transport cost such that gains from trade are positive, how
       does the size of the gain from trade depend on the parameter b, and why? How
       does it depend on a, and why?

   b. Starting from a level of the transport cost that is high enough to prevent trade
       entirely, consider the effect of lowering it. At what level of t does a further fall in
       t first increase world welfare?

3. Suppose that domestic demand expands in the Reciprocal Dumping Model in the
   following sense: for any given price, the quantity demanded increases by 30 units.
   What will happen to the outputs of both firms and to the Nash equilibrium domestic
   price?

4. In the partial equilibrium, monopolistic competition model, suppose that the fixed
   cost, F, of all actual and potential firms in both countries were to fall to half of what it
   was before. What would happen to the number of firms in the world, their outputs
   per firm, and total output and trade of the world economy?

5. Consider an industry in which a country is initially, with free trade, a net exporter (its
   exports are positive, and greater than its imports, if any). Suppose that an
   improvement in technology were to cause marginal cost of production to fall in that
   industry, in that country only, by the same amount for any and all firms and for any
   and all levels of output. What will happen to the output of that industry in the country
   and to the quantity of the good exported in each of the following models?

   a. The Heckscher-Ohlin Model

   b. The single-domestic-firm model

   c. The Reciprocal Dumping (duopoly) Model

   d. The monopolistic competition model