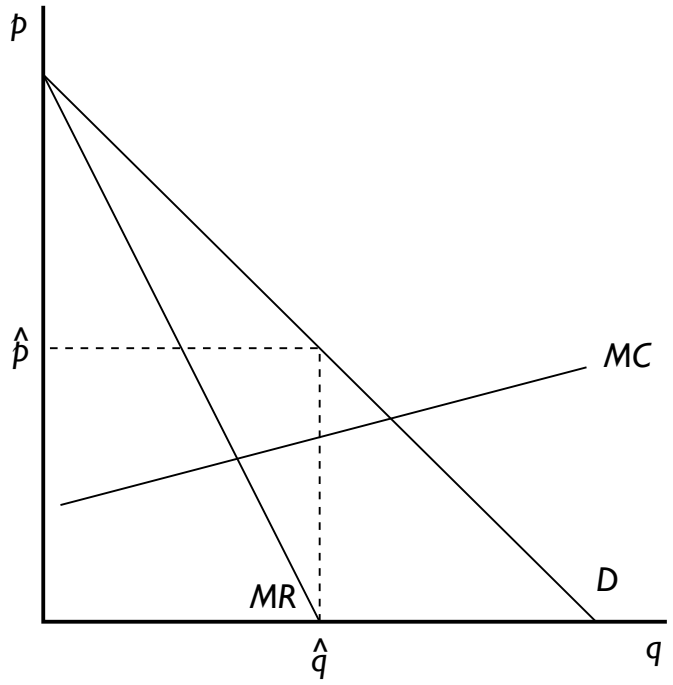
ECON 224, Prof. Hogendorn

Problem Set 1

1. *ProfitMax.* A monopoly firm produces quantity $\hat{q}$ at price $\hat{p}$ as shown in this diagram:



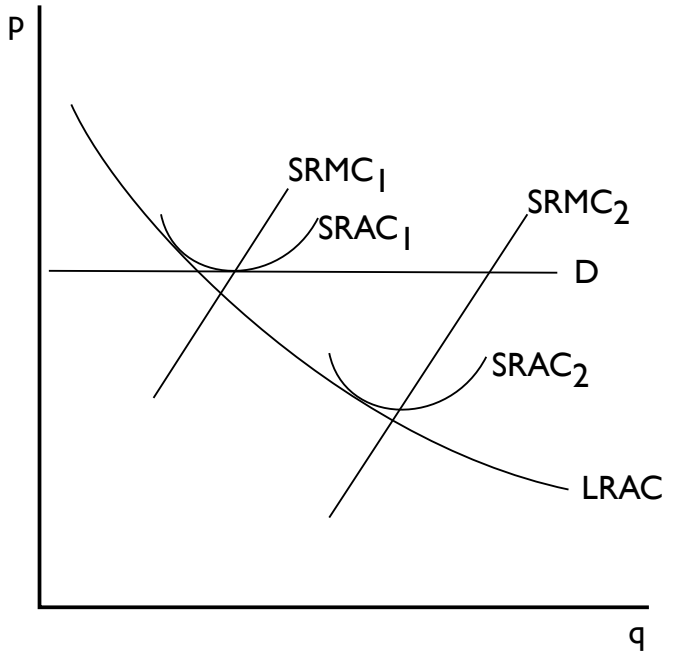
   (a) Does this firm maximize profit? Explain.

   (b) Is there any deadweight loss? How much?

   (c) If this firm is under threat of government regulation, does that help explain the firm's decision to produce $\hat{q}$?

   (d) Harder. Without drawing any additional curves on the diagram, show how much operating profit this firm makes.

2. *LongRun.* Currently, the industry shown in the following diagram is in a long-run, perfectly competitive equilibrium with many firms all using technology 1.



   (a) What quantity does a type-1 firm produce? How much profit does it make?

   (b) Suppose technology 2 becomes available. Nevertheless, there are some firms that would like to stay with technology 1 because they believe that the type of work involved in technology 1 is more creative and personally fulfilling. Can these firms stay with technology 1 in the long run?

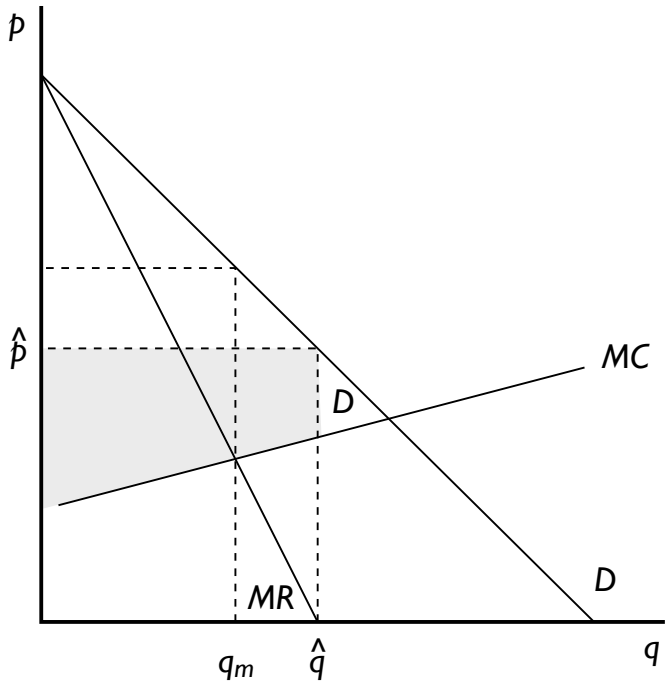
3. Are the services of Middletown's snow plows rival or nonrival? Excludable or nonexcludable?

4. You should know how to do all the problems at the end of Chapter 2.

5. You should know how to do Chapter 3, problems 3, 4, 6, and 8.

Answers:

1. *ProfitMax_a.*



   (a) No, this firm does not maximize profits because the marginal cost of $\hat{q}$ is greater than the marginal revenue. Profits would therefore rise if the firm cut output. The profit-maximizing output is where $MR + MC$, labeled q_m on the diagram.

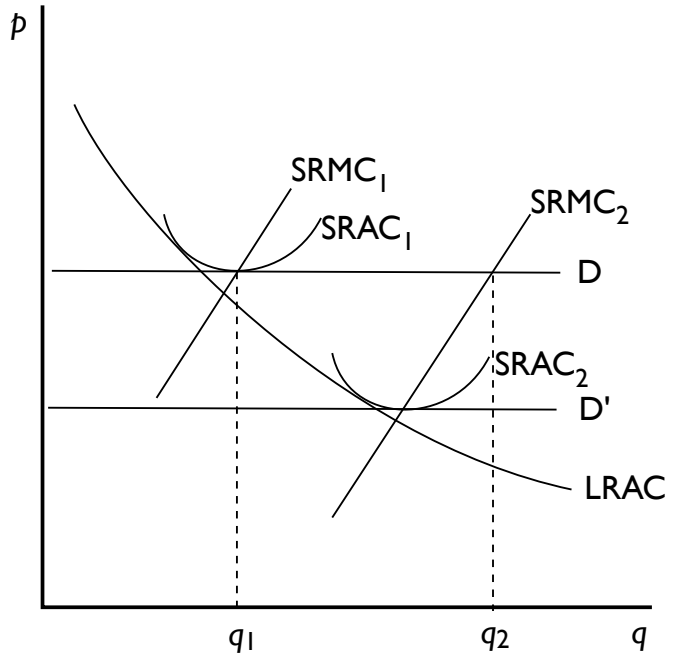
   (b) Yes, there is a deadweight loss, labeled D in the diagram. It is obviously larger than the zero deadweight loss that would occur if the firm behaved like a perfect competitor, but it is smaller than the deadweight loss of a profit-maximizing monopoly.

   (c) Yes, if there is some chance the government will regulate the firm, it might want to avoid the image of being an inefficient monopoly. Increasing output, and thereby decreasing price and deadweight loss, is a way of making the firm less costly to society.

Of course, this comes at the expense of reduced profits, but those profits might still be higher than what would be earned under regulation.

(d) The operating profit is the revenue minus the variable cost. In this case, total revenue is equal to the area $\hat{p}\hat{q}$. Total variable cost is the area under the marginal cost curve between $q = 0$ and $q = \hat{q}$. The difference between these is operating profit, the shaded trapezoid in the figure.

2. *LongRun_a.* Currently, the industry shown in the following diagram is in a long-run, perfectly competitive equilibrium with many firms all using technology 1.



(a) Each type 1 firm maximizes its profit by setting marginal cost equal to price, producing output q_1. Since the firms are in long-run equilibrium, price also equals average cost at that point. As a result, the firms do not make any economic profit.

(b) Initially, a small number of type 2 firms could enter the industry and produce output q_2. They would earn large profits since price is well above SRAC_2, while the type-1 firms would continue to earn zero profit.

However, the large profits available to type-2 firms would attract entry into the industry. Even if none of the type-1 firms changed technology, capital would move into the industry from other sectors of the economy. Eventually, the entry of type-2 firms would increase market supply and thus decrease equilibrium price. The new demand curve facing a single firm would shift to D' in the diagram. At this price, type-2 firms would make zero economic profit, but type-1 firms would incur a heavy loss. Eventually, all type-1 firms would have to leave the industry.

Note that all of this is based on the homogeneous-good demand curve which is given in the problem. If, somehow, the type-1 firms could differentiate their product, they could command a higher price, and perhaps then they could stay in business.

3. Plowed streets are both nonrival and nonexcludable. They are nonrival because one car driving on a plowed street does not somehow "unplow" the street. And they are nonexcludable because there is no way to prevent cars from using the plowed streets.

   On the other hand plowed driveways are rival and excludable. They are rival because if one driveway is plowed, then the time and energy taken to plow it was not used on another driveway. And they are excludable because normal property laws prevent drivers from using driveways without permission (note that the fact that most driveways are dead-end is important to enforcing these laws – *through* driveways are more difficult to exclude and are often used as illegal shortcuts).

   If you define snowplow services somewhere in between these two extremes, such as comparing plowed and unplowed sections of town, then the services are partially rival and excludable.