

2. Copper is produced in a perfectly competitive market with an upward-sloping supply curve and a downward-sloping demand curve. Assume the production of copper results in liquid waste, which seeps into local rivers. The contaminated river water causes human illnesses and crop failures downstream. The marginal external cost from producing copper is constant across all quantities of copper produced.
- (a) Draw a correctly labeled graph of the copper market with the marginal social benefit (MSB), marginal private benefit (MPB), marginal social cost (MSC), and marginal private cost (MPC) curves, and show each of the following.
- (i) The market equilibrium quantity, labeled Q_M
 - (ii) The socially efficient quantity, labeled Q_S
- (b) Suppose the demand for copper decreases. On your graph in part (a), show the deadweight loss at the new market equilibrium, shaded completely.
- (c) Suppose the government is considering levying a tax on copper.
- (i) What per-unit tax level would achieve the socially optimal quantity?
 - (ii) Explain why a lump-sum tax on producers will not achieve the socially optimal quantity in the short run.

Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

3. The table below shows the total cost and total benefit of advertisements placed by AZY Foods, a firm in the retail food market.

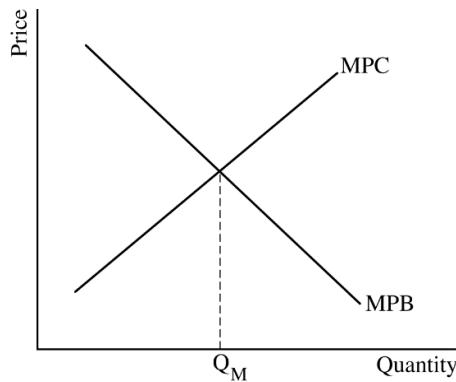
Number of Advertisements	Total Cost (\$)	Total Benefit (\$)
1	300	1,200
2	500	2,200
3	800	3,000
4	1,300	3,600
5	2,100	4,000
6	3,000	4,200
7	4,100	4,200

- (a) Calculate the total net benefit of placing three advertisements. Show your work.
- (b) Calculate the marginal net benefit of the third advertisement. Show your work.
- (c) What is the optimal number of advertisements placed by AZY Foods? Explain using marginal analysis.
- (d) Suppose over the next year the marginal benefit that AZY Foods receives from each advertisement increases by \$300. Identify the optimal number of advertisements.
- (e) There are many firms in the retail food market. Each firm places its own firm-specific advertisements without considering the actions of its competitors. In what market structure is AZY Foods operating?

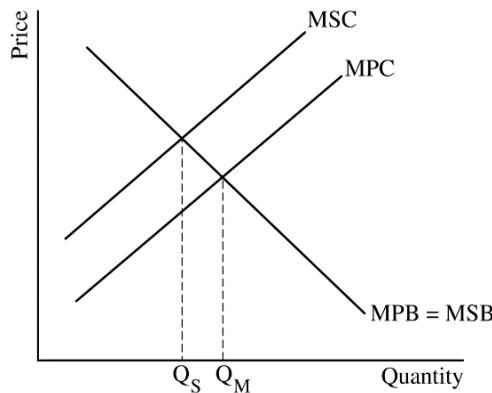
Begin your response to this question at the top of a new page in the separate Free Response booklet and fill in the appropriate circle at the top of each page to indicate the question number.

Question 2: Short**5 points**

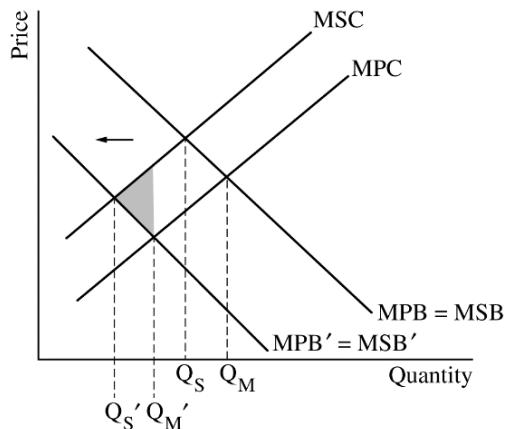
- (a) Draw a correctly labeled graph with an upward-sloping supply curve labeled MPC, a downward-sloping demand curve labeled MPB, and the market equilibrium quantity labeled Q_M .

**1 point**

For the second point, the graph must include the MSC curve above the MPC curve at all output levels and must show the socially efficient quantity labeled Q_S .

**1 point****Total for part (a) 2 points**

- (b)** On your graph from part (a), show a leftward shift of the demand curve and shade completely the area of deadweight loss at the new market equilibrium. **1 point**



- (c) (i)** State that the per-unit tax would be equal to the marginal external cost ($MSC - MPC$). **1 point**
- (ii)** Explain that the lump-sum tax will not change the quantity produced because it does not affect the marginal cost. **1 point**

Total for part (c) 2 points

Total for question 2 5 points