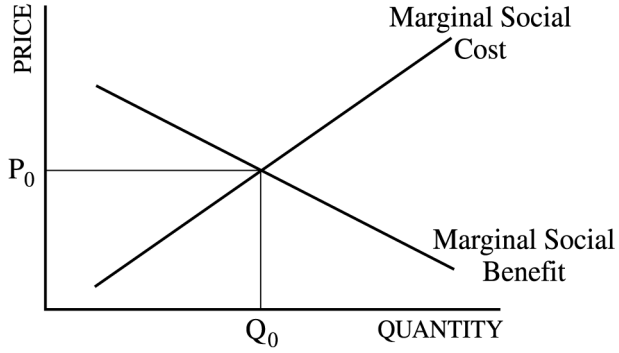
2. The graph below shows the price (P_0) and quantity (Q_0) at which there is an efficient allocation of resources.



However, in some cases the market fails to allocate resources efficiently.

(a) Assume the chemical industry is polluting the air.

(i) Using marginal benefit and marginal cost analysis, explain how the chemical industry is misallocating resources.

(ii) Identify one policy or action the government could take to correct this market failure.

(b) Assume it is difficult to exclude nonpayers from enjoying the benefits of national defense.

(i) Using marginal benefit and marginal cost analysis, explain how the private market will fail to produce the efficient level of national defense.

(ii) Identify one policy or action the government could take to correct this market failure.

3. The table below shows total utility in utils that a utility-maximizing consumer receives from consuming two goods: apples and oranges.

Apples		Oranges	
Quantity	Total utility	Quantity	Total utility
0	0	0	0
1	20	1	30
2	35	2	50
3	45	3	65
4	50	4	75
5	52	5	80

Assume that apples cost $1 each, oranges cost $2 each, and the consumer spends the entire income of $7 on apples and oranges.

(a) Using the concept of marginal utility per dollar spent, identify the combination of apples and oranges the consumer will purchase. Explain your reasoning.

(b) With the prices of apples and oranges remaining constant, assume that the consumer's income increases to $12. Identify each of the following.

(i) The combination of apples and oranges the consumer will now purchase

(ii) The total utility the consumer will receive from consuming the combination in (i)

(c) With income remaining at $12, assume the price of oranges increases to $4 each. Identify each of the following.

(i) The combination of apples and oranges the consumer will now purchase

(ii) The total utility the consumer will receive from consuming the combination in (i)

END OF EXAMINATION

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Question 2

Correct Answer:

Part a: Within the chemical industry (or market) at the unregulated level of output the marginal social cost of production exceeds the marginal social benefit. In other words, with this negative externality, there is an over allocation of resources to the chemical industry; the level of output is greater than the efficient level. The government should introduce a per unit tax on output, raising the marginal private cost of production and reducing output. Alternatively, the government could introduce some measure to reduce directly the level of output.
Part b: National defense is a public good. Individuals have an incentive to withhold their true demand or willingness to pay for the good, i.e., the free-rider problem. Thus, at the level of output produced the marginal benefit of national defense exceeds the marginal cost of national defense; there is an under allocation of resources to national defense. The government could assume production of national defense and tax all members of the society to pay for the national defense. Or, a per-unit subsidy to private producers would lead to an increase in the output of national defense.

Grading Rubric:

6 Points = 3 in part a + 3 in part b

(a) Chemical industry and pollution **(3 points**)

(i) Acceptable answers include: **(1 point)**
- Too much output
- Over allocation of resources to the market
- Showing higher than efficient output on graph

Acceptable answers include: **(1 point)**
- MSC > MSB at the unregulated output
- MSC > MPC
- MC > MB with term "negative externality"

(ii) Acceptable answers include: **(1 point)**
- Tax on output
- Quantity restriction
- Permits
- Liability and lawsuit

Question 2 (cont'd.)

(b) National Defense (**3 points**):

(i) Acceptable answers include: **(1 point)**
Too little produced
Under allocation of resources
Showing lower than efficient output on graph

Acceptable answers include: **(1 point)**
MSB > MSC at the unregulated output
MSB > MPB
Free-rider problem

(ii) Acceptable answers include: **(1 point)**
Public production of national defense
Tax to finance public production of national defense
Subsidy, if there are private producers of national defense

Commentary:
We began this question reminding students that an efficient allocation of resources occurs when the marginal social cost equals the marginal social benefit. Students then had to assess two situations in which an efficient allocation of resources does not occur and to explain why inefficiency exists.