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a) The externality is negative, because the social cost for each additional unit is higher than the private cost for that unit.

b) The socially optimal output is at Q₂, because that is where marginal social cost = marginal social benefit.

c) i) An unregulated monopoly would produce at Q₁, because that is where the marginal production costs (marginal private costs) = marginal revenue.

ii) To move output from Q₁ to Q₂, a government subsidy is required.

iii) The subsidy should be $3 per unit. This would push marginal private costs down to $4, which would then intersect the marginal revenue curve at Q₂, the desired output.

d) i) A perfectly competitive firm would produce at an equilibrium output of Q₃, because that is where their marginal private cost = demand.

ii) To move output from Q₃ to Q₂, the government should tax the industry.

iii) A $5 tax is needed, which would move the marginal private cost curve up to $12. This makes the marginal private cost intersect the demand curve at the desired output of Q₂.
(A) The externality is negative because it has a greater social cost than its private cost.
(B) The socially optimum output is Q2 because that is where the Marginal Social Benefit is equal to the Marginal Social Cost.
(C) A profit-maximizing monopoly will produce at the level where Marginal Private Cost equals Marginal Revenue, therefore produces Q1 units of good X. To produce a socially optimum output, Q2, the government should place a $1 dollar per-unit tax on the firm.
(D) A perfectly competitive industry will produce at Q3, where MPC is equal to Demand. To produce a socially optimum output of Q2, the government should subsidize the firms in this industry at a rate of $5 per-unit.
1. 

(a) The externality is negative because it exists below the Marginal Social Benefit.

(b) The socially optimum output would be Q_2 because here it exceeds or meets all costs & benefit.

(c) (i) Q_1 because it is where MPC crosses MR, however they would set price up to P_3 where Q_1 leads up to demand.

(ii) It should tax the firm because at this level they are attaining an economic profit.

(iii) \$60

(d) (i) Q_1 where MPC meets MR.

(ii) They should subsidize the firm because they are producing at a level where they are not meeting demand. Thus exists a shortage.

(iii) \$3