2. The table below shows the output a firm produces using different amounts of capital (K) and labor (L). The markets for capital and labor are perfectly competitive. The rental rate of capital is $75 per unit, and the wage rate is $200 per unit. In the short run, capital is fixed and labor is variable.

Labor	Output with K=1	Output with K=2
0	0	0
1	10	20
2	25	50
3	38	75

(a) If the firm uses one unit of capital and one unit of labor, will it be operating with constant, increasing, or decreasing returns to scale? Explain using numbers from the table.

(b) Assume now that the firm currently has two units of capital and is using three units of labor.

(i) Calculate the marginal product for the third unit of labor. Show your work.

(ii) Did the firm experience diminishing marginal returns with the addition of the third unit of labor? Explain using numbers from the table.

(iii) Calculate the firm's average total cost for its current level of production. Show your work.

(iv) If the firm's output is sold in a competitive market, what is the lowest output price at which the third unit of labor would be hired?

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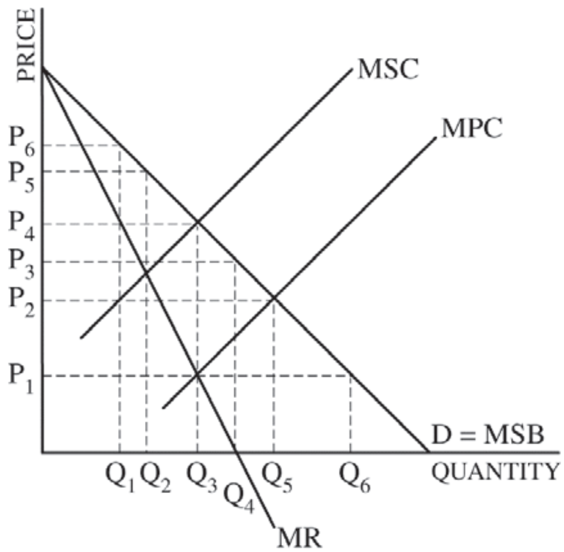
3. The graph below shows the marginal social cost (MSC), marginal private cost (MPC), marginal social benefit (MSB), demand (D), and marginal revenue (MR) curves for a monopoly.



(a) Identify the monopolist's

(i) profit-maximizing quantity

(ii) profit-maximizing price

(b) What information in the graph indicates that there is a negative externality?

(c) Identify the socially optimal quantity.

(d) In the case in which the government imposes a per-unit tax equal to the marginal external cost, identify each of the following.

(i) The dollar value of the tax, using the price labels from the graph

(ii) The profit-maximizing quantity associated with the tax

(e) Given the monopoly facing the negative externality, would the deadweight loss increase, decrease, or stay the same as a result of imposing the per-unit tax? Explain.

STOP

END OF EXAM

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Question 2

5 points (1 + 4)

(a) 1 point:

- One point is earned for stating that the firm would be operating with increasing returns to scale and for explaining that doubling inputs will more than double output (output increases from 10 units to 50 units as a result of doubling labor and capital) **or** for explaining that average total cost decreases from \$27.50 to \$11 when labor and capital double.

(b) 4 points:

- One point is earned for correctly calculating the marginal product (MP) for the third unit of labor as 25 units and showing the work: $\frac{75-50}{3-2} = 25$.

- One point is earned for answering yes and for explaining that the MP of the third unit of labor (25 units) is less than the MP of the second unit of labor (30 units).

- One point is earned for correctly calculating the firm's average total cost (ATC) and showing the work: $\frac{75*2}{75} + \frac{200*3}{75} = 2 + 8 = \$10$ **or** $\frac{(75*2)+(200*3)}{75} = \frac{750}{75} = \$10$.

- One point is earned for identifying the lowest output price as \$8 at which the third unit of labor would be hired.

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