Monmouth COLLEGE

- Name: _____
- Date: _____
- Section: _____

ECON 300: Intermediate Price Theory

Problem Set #6 - Part #2

Fall 2024

Problem 1. Monopoly

Suppose that the output market for good x is in perfect competition, and that the demand (Q_x^D) and supply (Q_x^S) functions are given as:

$$\begin{cases} Q_x^D = 600 - P_x \\ Q_x^S = 200 + P_x \end{cases}$$

1.A. Find the equilibrium price (P_x^*) and quantity (Q_x^*).

- $P_x^* =$
- $Q_x^* =$

For the remainder of Problem 1, assume that good x is being produced by a single producer so that the market for good x is now monopolistic.

1.B. Derive the inverse demand function.

1.C. Derive the producer's total revenue function, $TR(Q)$.

1.D. Derive the producer's marginal revenue function, $MR(Q)$.

Problem 1. Monopoly (continued)

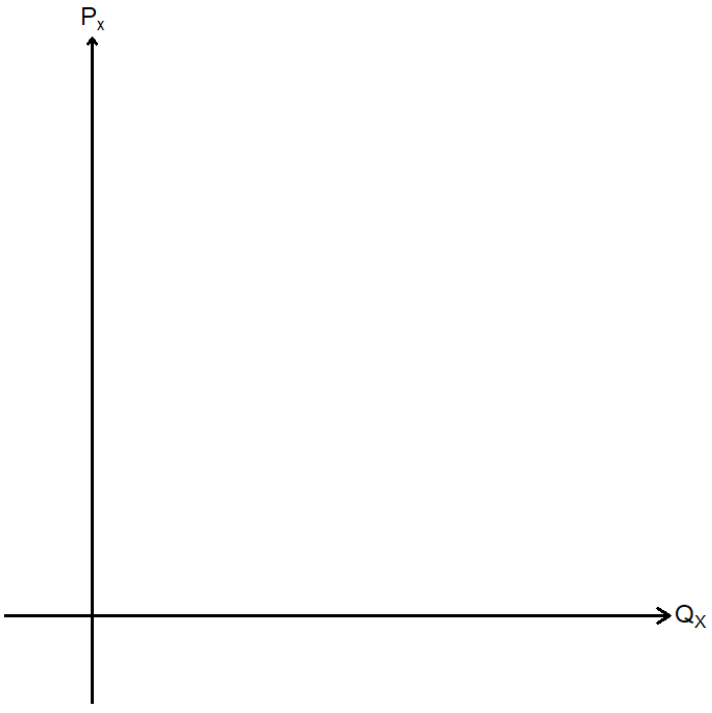
Suppose that the monopoly producer's total cost function is given as follows:

$$TC(Q) = 812 + 200Q - \frac{1}{2}Q^2$$

1.E. Derive the producer's marginal cost function, $MC(Q)$.
Hint: You do not have to take the derivative of the total cost function.

1.F. Find the profit-maximizing quantity and price for the producer.

1.G Plot the two different equilbria in the empty chart. Make sure to plot and label all elements that are listed below:



- The demand curve
- The supply curve.
- The marginal revenue curve.
- The market equilibrium under perfect competition.
- The market equilibrium under a monopoly.

Problem 2. Monopsony

Consider a monopsony in the labor market with one employer, and infinitely many individuals supplying labor. The market for the output x that this firm produces is perfectly competitive, and the market price for the output is given as $P_x = 5$. We further assume that labor is the only input in the production process, and the firm's production function $F(L)$ and the labor supply $w(L)$ in the labor market is given as follows:

$$F(L) = 50 + 30L - L^2$$
$$w(L) = 10 + 2L$$

2.A Derive the firm's total cost function $TC(L)$.

2.B Derive the firm's marginal cost function $MC(L)$.

2.C Derive the firm's total revenue function $TR(L)$.

2.D Derive the firm's marginal revenue function $MR(L)$.

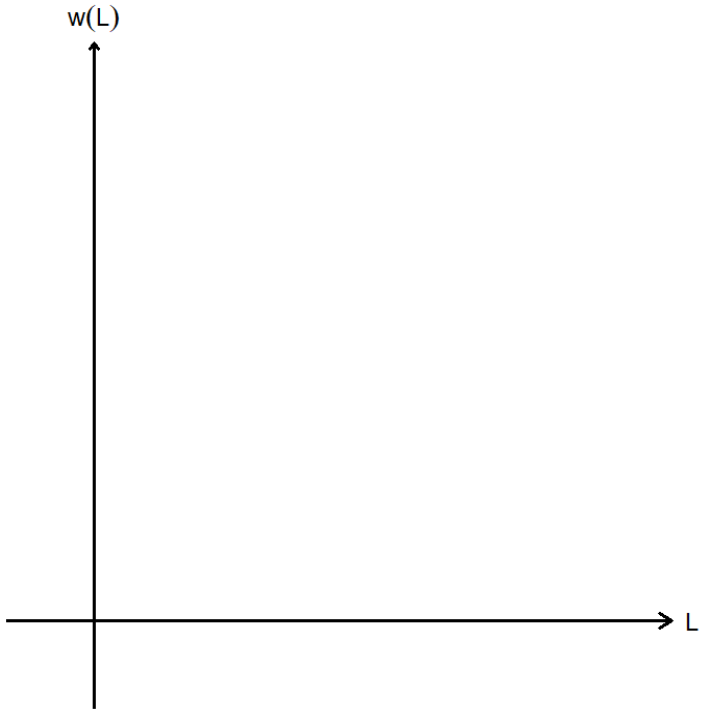
Problem 2. Monopsony (continued)

Consider a monopsony in the labor market with one employer, and infinitely many individuals supplying labor. The market for the output x that this firm produces is perfectly competitive, and the market price for the output is given as $P_x = 5$. We further assume that labor is the only input in the production process, and the firm's production function $F(L)$ and the labor supply $w(L)$ in the labor market is given as follows:

$$F(L) = 50 + 30L - L^2$$
$$w(L) = 10 + 2L$$

2.E Find the profit-maximizing wage and labor for the employer.

2.F Plot the labor market equilibrium for the monopsony employer in the chart. Make sure to plot and label all elements that are listed below:



- The labor demand curve
- The labor supply curve.
- The marginal cost curve.
- The market equilibrium under monopsony.

- Score: _____
- Extra Credit: _____