Monmouth COLLEGE

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

ECON 300: Intermediate Price Theory

Problem Set #7

INSTRUCTIONS:

- This problem set is not graded.

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Problem 1. Perfect Competition

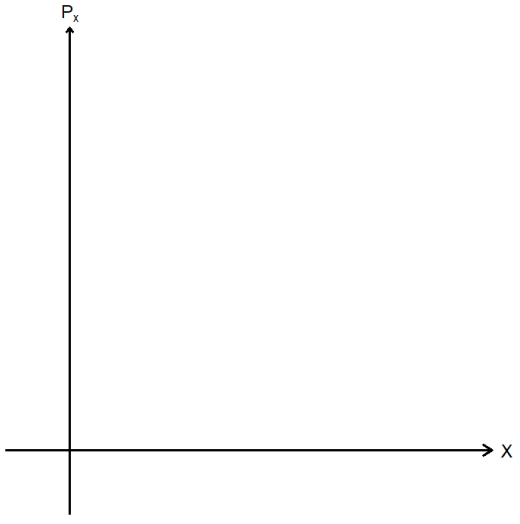
Suppose that the output market is in perfect competition, and that the demand (Q_x^D) and supply (Q_x^S) functions are given as:

$$\begin{cases} Q_x^D = 500 - P_x \\ Q_x^S = 200 + 2P_x \end{cases}$$

1.A State the five assumptions that define a perfectly competitive market.

1.B Find the equilibrium price and quantity.

1.C Plot the demand and supply curves in the empty chart. You must plot and label all elements clearly:



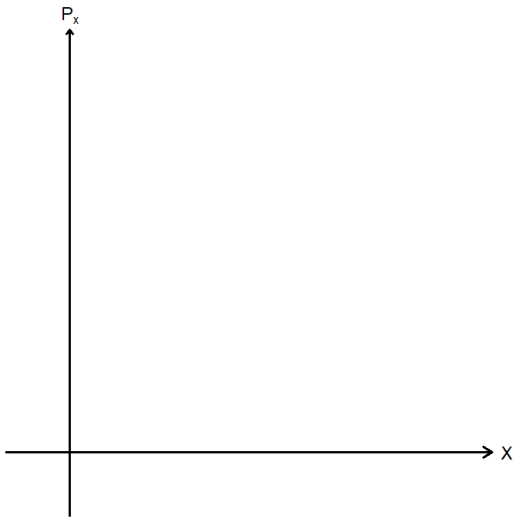
- The demand curve.
- The supply curve.
- The equilibrium price and quantity.
- ALL intercepts.

1.D What is the value of consumer surplus in this market?

1.E What is the value of producer surplus in this market?

1.F Find the equilibrium price and quantity when the supply shifts to $Q_x^S = 2P_x$.

1.G Plot the elements listed below in the empty chart. You must plot and label all elements clearly:



- The original demand curve.
- The new supply curve from 1.F.
- The equilibrium price and quantity.
- ALL intercepts.
- Consumer surplus.
- Producer surplus.

Problem 2. Price Controls

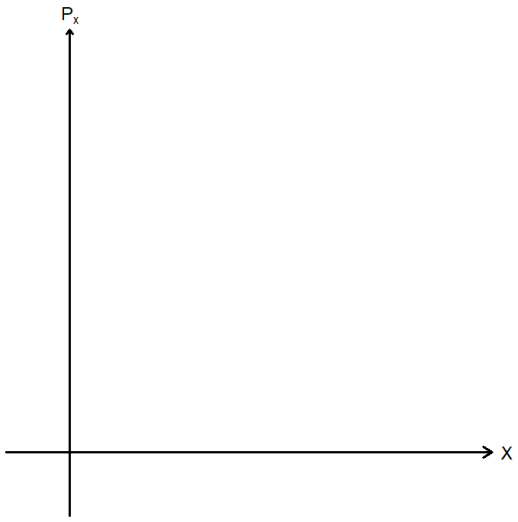
Suppose that the output market is in perfect competition with the same parameters as **Problem 1**. The demand (Q_x^D) and supply (Q_x^S) functions are given as:

$$\begin{cases} Q_x^D = 500 - P_x \\ Q_x^S = 200 + 2P_x \end{cases}$$

2.A The government sets a price ceiling of $\bar{P}_x = 80$. Is this price ceiling "binding?"

2.B Find the market price and quantity traded in the market following the price control.

2.C Plot the effect of the price ceiling in the empty chart below. You must plot and label all elements clearly:



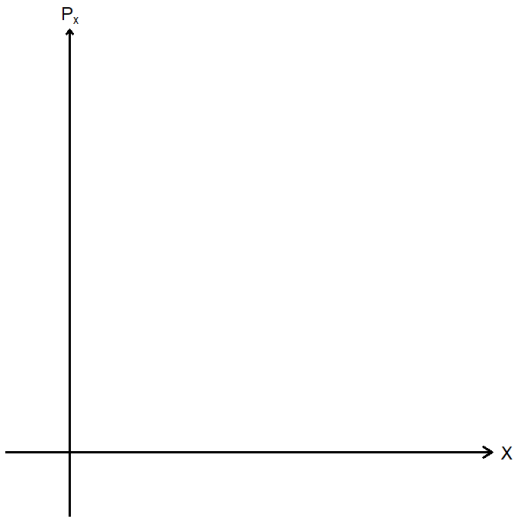
- The demand curve.
- The supply curve.
- The market price.
- The quantity traded in the market.
- ALL intercepts.

2.D What is the value of consumer surplus in this market with price controls?

2.E What is the value of producer surplus in this market with price controls?

2.F What is the value of deadweight loss in this market with price controls?

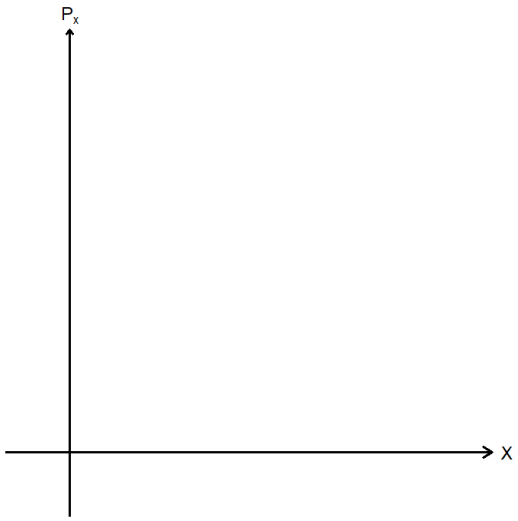
2.G Plot the elements listed below in the empty chart. You must plot and label all elements clearly:



- The demand curve.
- The supply curve.
- The market price.
- The quantity traded in the market.
- ALL intercepts.
- Consumer surplus.
- Producer surplus.
- Deadweight loss.

2.H What happens to the shortage / surplus if this price ceiling is maintained for an excessively long period?

2.I Plot the short run and long run effects of the price ceiling in the empty chart below. You must plot and label all elements clearly:



- The demand curve.
- The short run supply curve.
- The long run supply curve (approx.).
- Shortage / surplus in the short run.
- Shortage / surplus in the long run.

Problem 3. Taxation

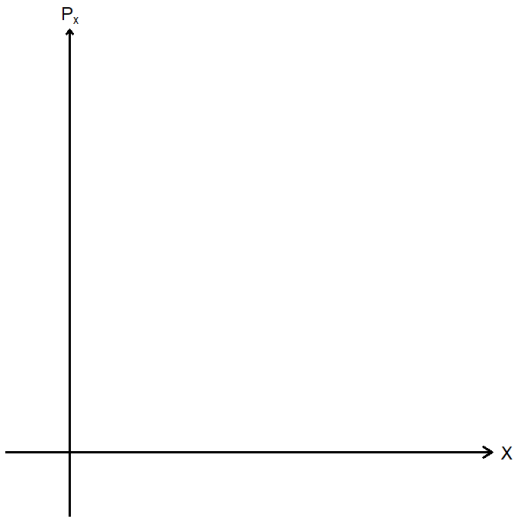
Suppose that the output market is in perfect competition with the same parameters as **Problem 1**. The demand (Q_x^D) and supply (Q_x^S) functions are given as:

$$\begin{cases} Q_x^D = 500 - P_x \\ Q_x^S = 200 + 2P_x \end{cases}$$

3.A What is the equilibrium price and quantity if the government imposes a \$5 per unit tax?

3.B What information do you need to determine whether the consumer or the producers bear a greater burden from taxation?

3.C Plot the effect of taxation in the empty chart below. You must plot and label all elements clearly:



- The demand curve.
- The supply curve.
- The market price.
- The quantity traded in the market.
- ALL intercepts.

3.D What is the value of consumer surplus in this market with taxation?

3.E What is the value of producer surplus in this market with taxation?

3.F What is the value of deadweight loss in this market with taxation?

3.G What is the value of government revenue in this market with taxation?

Problem 4. Market Structures: Monopolies

Suppose that you are a profit maximizing monopoly producer of good x. The market demand function is estimated to be $Q_x^D = 500 - P_x$, and your total cost function is given as: $TC(Q_x) = 100 + Q_x^2$.

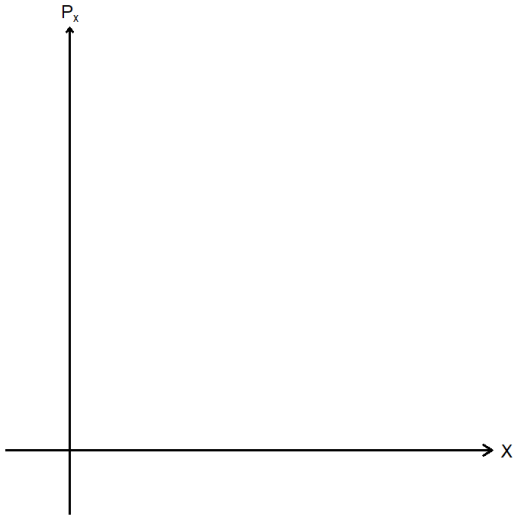
4.A Find the mathematical expression for your total revenue function.

4.B Find your marginal revenue function.

4.C Find your marginal cost function.

4.D What is your profit maximizing quantity and price?

4.E Complete the empty chart with the elements listed below. You must plot and label all elements clearly:



- The market demand curve.
- The marginal revenue curve.
- The marginal cost curve.
- The quantity traded in the market.
- ALL intercepts.

4.F What is the source of your firm's market power?

4.G Suppose that you had the same market conditions given in **Problem 4**, but the output market was perfectly competitive. What would the equilbrium market quantity and price be?

Problem 5. Market Structures: Cournot Duopolies

Suppose firm A and firm B are competing in the market where the market demand is given as $Q = 500 - P_x$. Competition is over production quantity, and the firms' total cost functions are given as:

$$\begin{cases} TC_A(Q) = 50 + Q \\ TC_B(Q) = 10 + 2Q \end{cases}$$

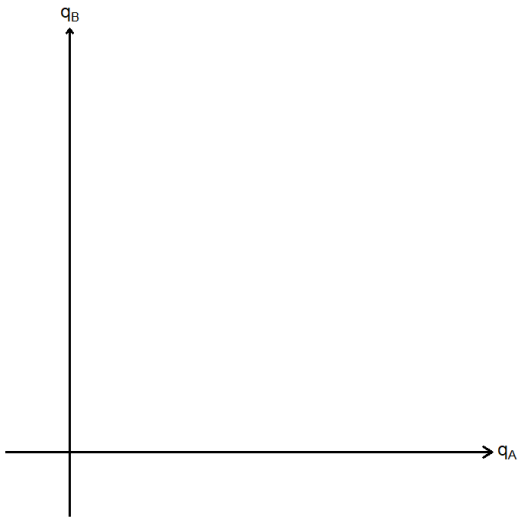
5.A Find the profit function for firm A.

5.B Find the profit function for firm B.

5.C Find the best response function of firm A.

5.D Find the best response function of firm B.

5.E Plot the firms' best response functions in the empty chart below. You must plot and label all elements clearly:



- The best response curve of firm A.
- The best response curve of firm B.
- ALL intercepts.
- The equilibrium quantity.

Problem 6. Static Games of Complete Information

Suppose that there are two players (players 1 and 2) interacting in a static game of complete information. Each player can choose either Up (U) or Down (D).

6.A What does "Static" mean in this context?

6.B What does "Complete Information" mean in this context?

6.C Suppose that the payoff structure is given as follows. Express the game in its normal form representation below, and find all Nash equilibria.

- When both players 1 and 2 play U, their payoffs are 10 each.
- When both players 1 and 2 play D, their payoffs are 5 each.
- When players 1 and 2 play different actions, the player playing U will get a payoff of 2, and the player playing D will get a payoff of 15.

6.D Suppose that this game is repeated 5 times. Would the players be able to cooperate for at least one period? Why?

6.E Suppose that this game is repeated 500 times. Would the players be able to cooperate for at least one period? Why?

6.F Suppose that this game is repeated indefinitely. Would the players be able to cooperate for at least one period? Why?

Problem 7. Static Games of Complete Information

Suppose that two players are playing the following static game of complete information.

		Player 2		
		L	C	R
Player 1	U	(10,2)	(3,8)	(11,10)
	D	(3,5)	(2,12)	(0,12)

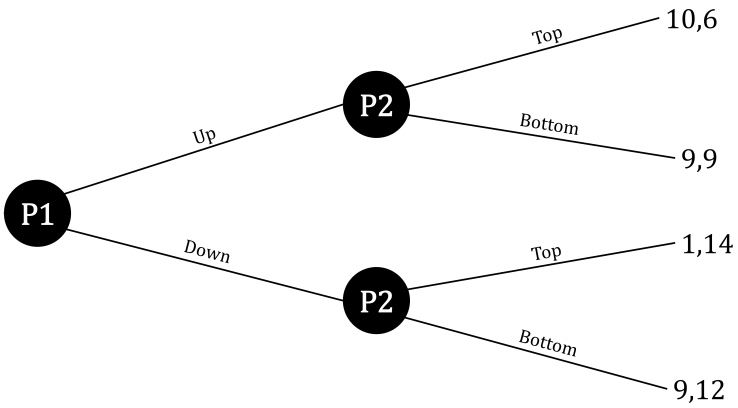
7.A Are there any dominant / dominated strategies for player 1?

7.B Are there any dominant / dominated strategies for player 2?

7.C Find all Nash equilibria for this game.

Problem 8. Dynamic Games of Complete Information

Suppose that two players are playing the following dynamic game of complete information.



8.A What are the Nash equilibria of the game described above?

8.B Represent this game in its normal form below:

8.C Find all Nash equilibria using the normal form found in 8.B.

8.D Does your answer from 8.C match that of 8.A? If not, why?
Hint: Does player 2's strategy BB make sense?