Introductory Microeconomics
Homework 6: Monopoly

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1. T/F. A monopolist maximizes profit by setting price equal to marginal cost.
2. T/F. A monopolist can increase total revenue by lowering price if demand is elastic.
3. T/F. A natural monopoly arises when a firm experiences increasing marginal costs over all levels of output.
4. T/F. A monopolist that perfectly price discriminates eliminates deadweight loss.
5. T/F. A monopolist maximizes total revenue.
6. A monopolist has the following cost structure: $\text{TC} = q^2$ and $\text{MC} = 2q$. The market demand is $Q_D(p) = 12 - p$ with $\text{MR} = 12 - 2q$.
   (a) Find the price the monopolist chooses and the resulting quantities.
   (b) Find the profits and the consumer surplus.
   (c) Plot your answers.
7. A monopolist has the following marginal cost $\text{MC} = q$.
   (a) Assume $Q_D(p) = 12 - p$ with $\text{MR} = 12 - 2q$. Find: 1) The monopolist price and quantity, 2) The elasticity of demand around the monopoly price[1], and 3) The mark-up over price defined as: mark-up $= \frac{p_M - \text{MC}}{p_M}$.
   (b) Assume $Q_D(p) = 8 - \frac{2}{3}p$ with $\text{MR} = 12 - 3q$. Repeat (a).
   (c) Comment on the relation between the elasticity of demand and the mark-up. You may want to calculate the inverse of the elasticity $1/\varepsilon$.
8. The market demand is $Q(p) = 4 - p$ with $\text{MR} = 4 - 2q$. A monopolist operates in this market. For simplicity assume its total and marginal cost are normalized to zero $\text{TC} = \text{MC} = 0$.
   (a) Calculate the price and quantities. Calculate the profits.

   Now assume the monopoly can perfectly discriminate. It can sell each unit at a a different price.

Unit #:	Sold at price:	Profit for this unit:
1		
2		
3		
4		

   (b) Complete the table.

[1] You may calculate it between $p_M - 1$ and $p_M + 1$.

(c) Calculate the profits.

9. A movie theater close to an university faces the following demand curves from students and non-students. For simplicity assume that TC = 0 and MC = 0.

Students			
p	q	TR	MR
5	0		×
4	1		
3	2		
2	3		
1	4		
0	5		

Non-Students			
p	q	TR	MR
9	0		×
8	1		
7	2		
6	3		
5	4		
4	5		
3	6		
2	7		
1	8		
0	9		

Aggregate Demand			
p	q	TR	MR
9			×
8			
7			
6			
5			
4			
3			
2			
1			
0			

First assume the firm charges a different price for students vs non-students.

(a) Find the total revenue and the marginal revenue for students and non-students.

(b) Find the price and quantity that maximize profits for students vs non-students.

(c) Find the total profits the firm makes.

Now the city forces the movie theater to charge a single price.

(d) Find the aggregate demand, its total revenue, and its marginal revenue.

(e) Find the price and quantity.

(f) Find the profits.

10. A firm has a total cost of TC = q, with constant marginal cost MC = 1. It operates in a market with demand $Q_D(p) = 7 - p$, with marginal revenue MR = $7 - 2q$. Complete the following table assuming: (a) that the firm behaves competitively and (b) that the firm behaves as a monopolist.

	Competitive	Monopoly
p		
q		
CS		
Profits		