

# Principles of Microeconomics

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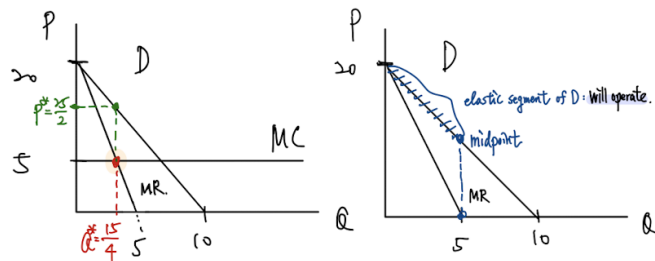
## Homework 7

Hsien-Chen Chu T09303304 Econ1

In this sheet the problem sets are answered sequentially.

1. Monopolist, given  $MC = 5$ ,  $D: P = 20 - 2Q$

(a)  $TR(Q) = P \cdot Q = 20Q - 2Q^2 \Rightarrow MR = \frac{dTR(Q)}{dQ} = 20 - 4Q$   
Optimal Output  $Q^*$ :  $MR = MC \Rightarrow 20 - 4Q = 5, Q^* = \frac{15}{4}$   
Price "Maker": plug  $Q^*$  in  $D$ :  $Q_D = \frac{20-P}{2}, P^* = \frac{25}{2}$



- (b) Maximize profit where  $MR = MC$ . Since  $MC \geq 0 \Rightarrow MR = MC \geq 0$ , it provides the critical point driving  $MR = 0, Q = 5$ . Referring this point vertically back to  $D$ , observe that the intersection point is right on the midpoint of  $D$ . Thus, a firm will operate on the left segment, which is elastic and has a range  $\{P = 20 - 2Q, 0 \leq Q \leq 5\}$
2. (D) Buyers who buy in bulk are often offered discounts. This is an example of **second-degree price discrimination**.  
*Expl.:* Second-degree: Different price set based on the characteristics of **the purchase**. [target: goods]
3. (D) When the price of the same product varies by location attributes, it is an example of **third-degree price discrimination**.  
*Expl.:* Third-degree: Different price set based on the characteristics of **the customers and locations**. [target: ppl, places]
4. (B) Refer to Table 1. If Agatha has \$80,000 in taxable income, her average tax rate is **20.2%**.  
*Expl.:*  $\frac{8375 \times 10\% + (34000 - 8375) \times 15\% + (80000 - 34000) \times 25\%}{80000} \div 20.22\%$
5. (B) Refer to Table 1. If Agatha has \$80,000 in taxable income, her marginal tax rate is **25%**.  
*Expl.:* \$80,000 lies in the segment which is charged a 25% tax rate.