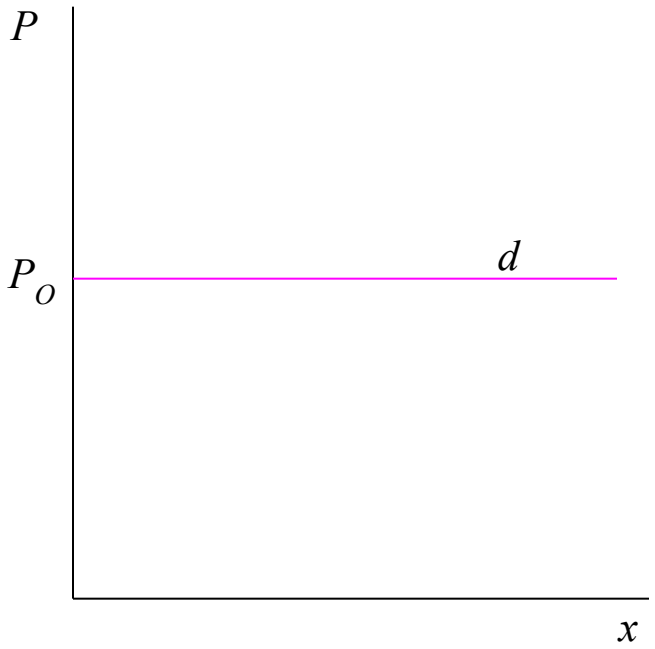
Monopoly

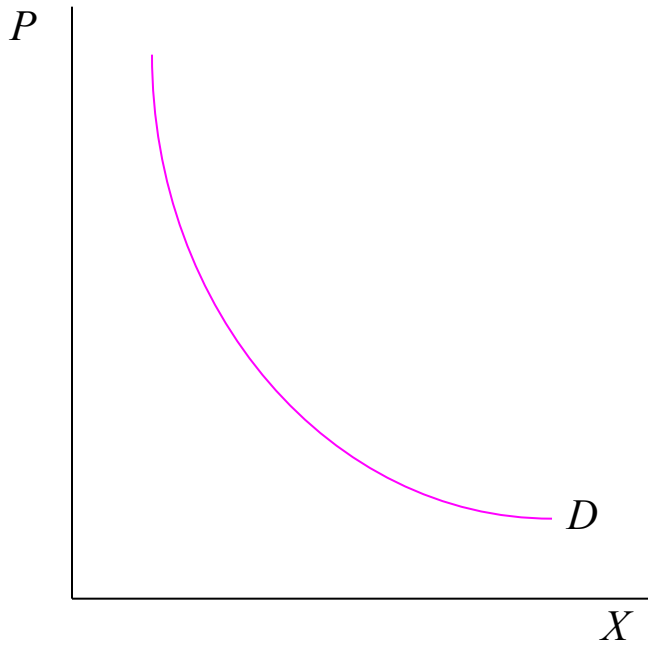
- A competitive firm chooses how much to produce at the "market price".

- A single seller – monopoly – chooses at what price to sell.

Competitive Firm



Monopoly



The Tradeoff

- The monopoly can either choose price or quantity, but not both.
- The monopolist faces a tradeoff between a higher price and lower sales (smaller quantity) and a lower price and higher sales (greater quantity):

$$P \downarrow \rightarrow X \uparrow$$

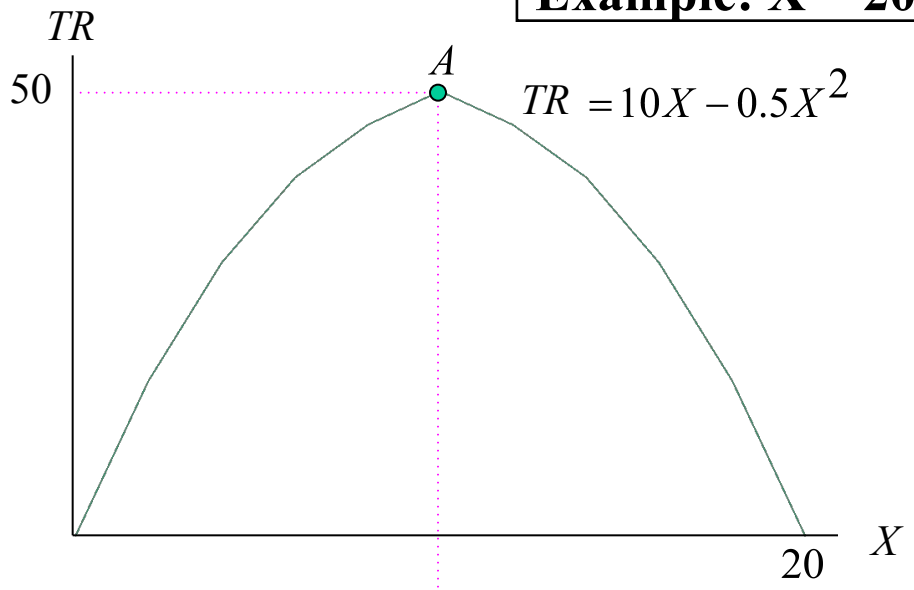
Revenue

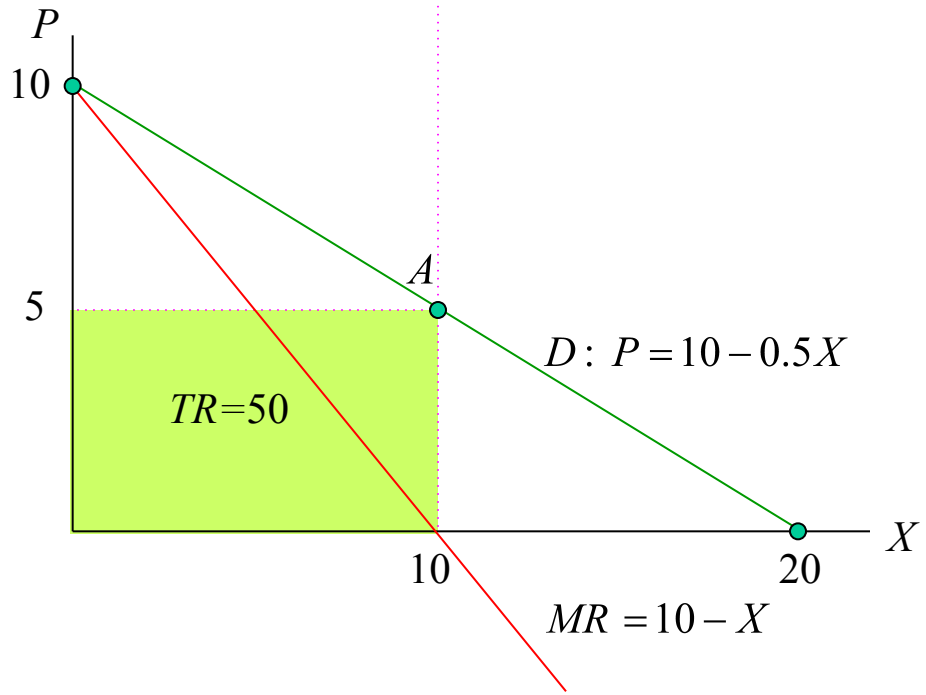
- Profit = Revenue – Total Costs
- Revenue = TR = Unit price • Quantity = P • X
- Increasing X is profitable if it increases Revenue more than it increases Costs.

Marginal Revenue

- Marginal Revenue = MR= the change in total revenue from increasing output by a unit.
- Marginal Cost = MC = the change in total costs from increasing output by a unit.
- Increasing output (decreasing price) is profitable if MR is greater than MC.
- Increasing output (decreasing price) is never profitable if MR < 0.

Example: X = 20 - 2P → P = 10 - 0.5X





P	X	$TR = PX$	$MR = \frac{\Delta TR}{\Delta X}$
10	0	0	
9	2	18	$18/2 = 9$
8	4	32	$14/2 = 7$
7	6	42	$10/2 = 5$
6	8	48	3
5	10	50	1
4	12	48	−1
3	14	42	−3
2	16	32	−5
1	18	18	−7
0	20	0	−9

$$TR = PX = (10 - 0.5X)X = 10X - 0.5X^2$$

$$\frac{dTR}{dX} = MR = 10 - X$$

$MR > 0 \Rightarrow TR \uparrow$

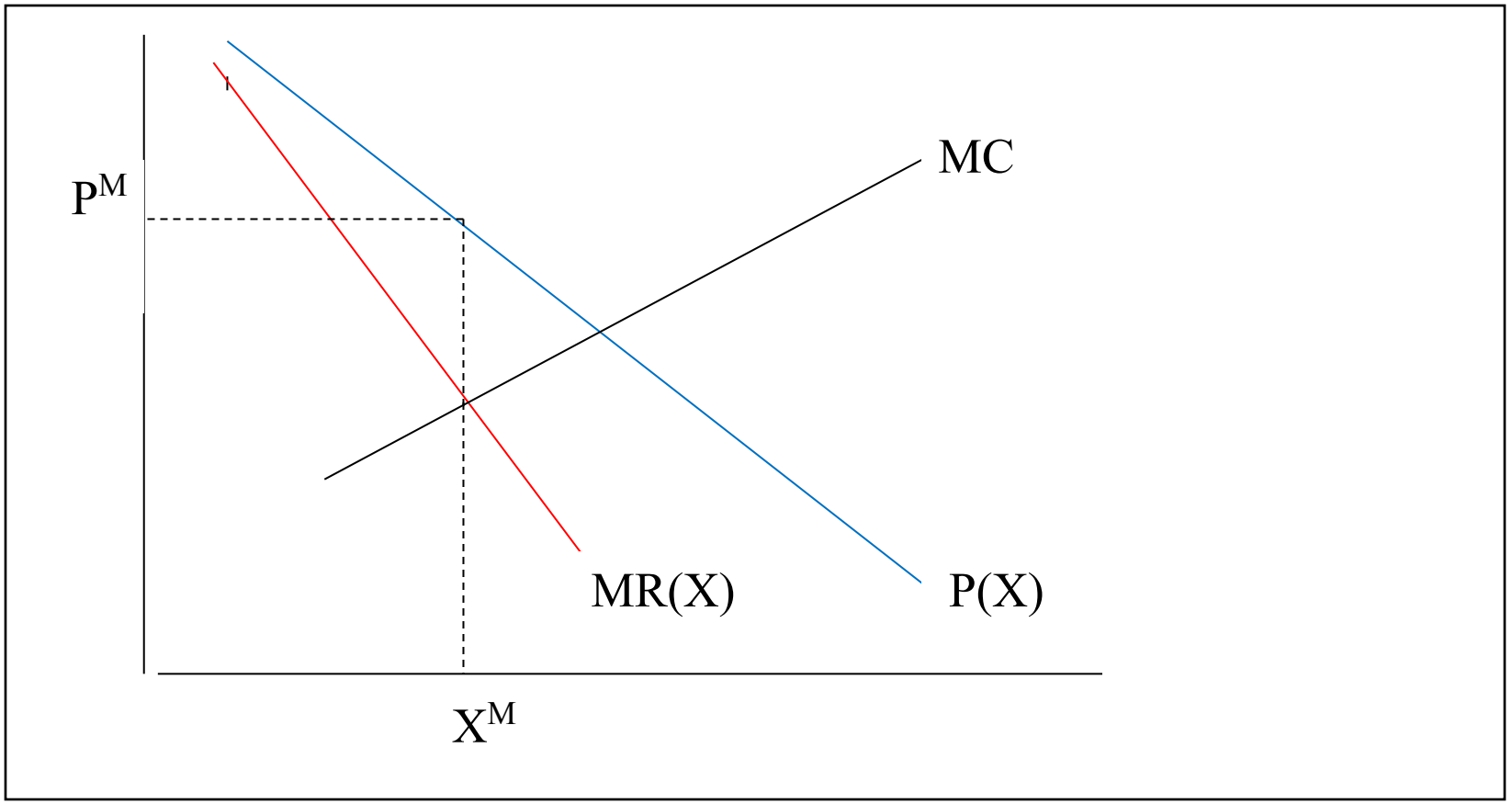
$MR < 0 \Rightarrow TR \downarrow$

$MR = 0 \Rightarrow TR$ max

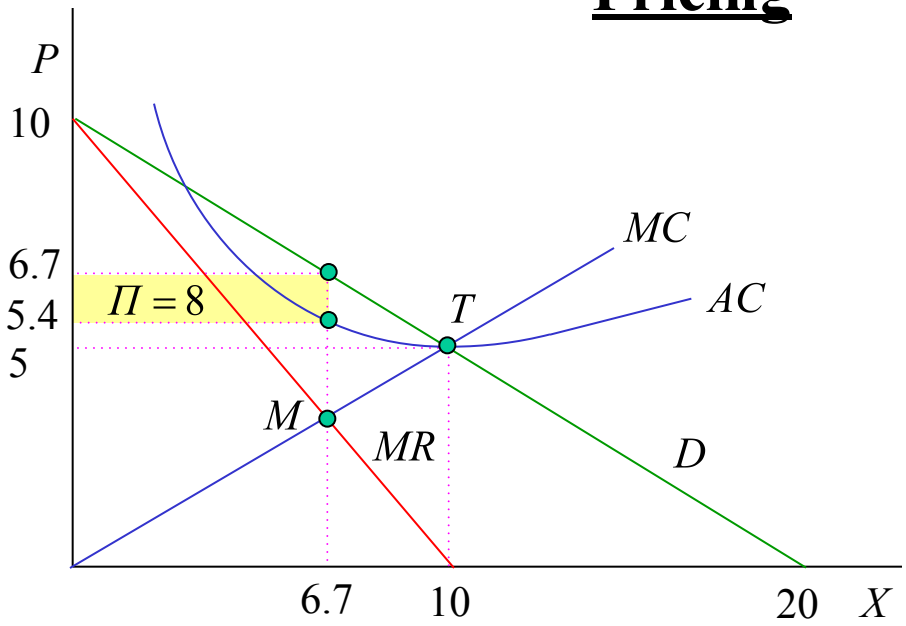
Profit Maximization

- $\boldsymbol{\Pi} = \mathrm{TR(X)} - \mathrm{TC(X)}$
- $\boldsymbol{\Pi}' = \mathrm{MR(X)} - \mathrm{MC(X)} = 0$
- Monopoly chooses X so that : $\mathrm{MR(X)} = \mathrm{MC(X)}$

Monopoly Pricing



Example: Monopoly Pricing



$$P = 10 - 0.5X$$

$$MR = 10 - X$$

$$TC = 0.25X^2 + 25$$

$$MC = 0.5X$$

$MC = MR$:

$$0.5X = 10 - X$$

$$X = 6.7$$

$$P = 10 - 0.5X = 10 - 0.5 \cdot 6.7 = 6.7$$

$$\Pi = TR - TC = 6.7 \cdot 6.7 - (0.25 \cdot 6.7^2 + 25) = 8$$

$$AC = \frac{TC}{X} = 0.25X + \frac{25}{X} = 0.25 \cdot 6.7 + \frac{25}{6.7} = 5.4$$

:In a competitive market

$$S = D$$

$$0.5X = 10 - 0.5X$$

$$X = 10$$

$$P = 10 - 0.5X = 10 - 0.5 \cdot 10 = 5$$

$$\Pi = TR - TC = 50 - 50 = 0$$

Elasticity

E=1: Changing price doesn't change Revenue – PX unchanged.

E>1: Decreasing price increases Revenue – PX increases
(Demand is price sensitive)

E<1: Decreasing price reduces Revenue – PX decreases.
(Demand is price insensitive)

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Elasticity and Monopoly Pricing

- Can be shown that : $MR = P\left[1 - \frac{1}{E}\right]$.
- Thus, if $E < 1$, $MR < 0 \rightarrow$ Monopoly never produces in region in which $E < 1$.
- This implies that the monopoly pricing rule can be written:

$$\frac{P-MC}{P} = \frac{1}{E}$$

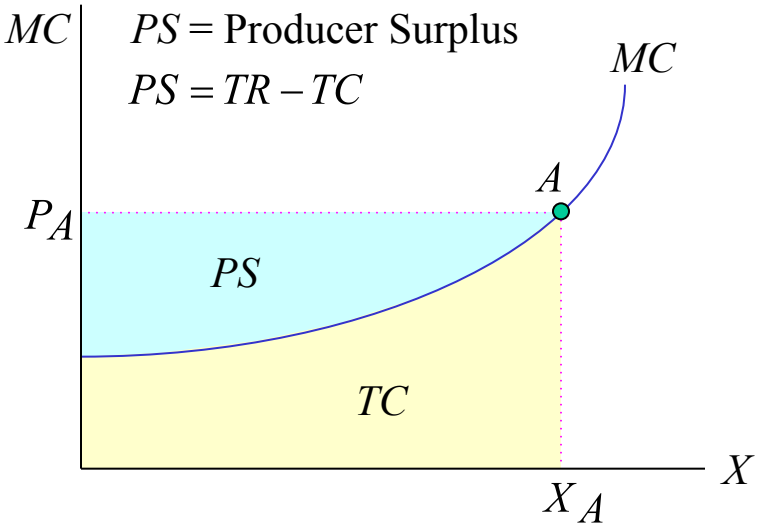
where $\frac{P-MC}{P}$ is the (relative) **markup** (difference between price and marginal cost) → Markup decreases with elasticity.

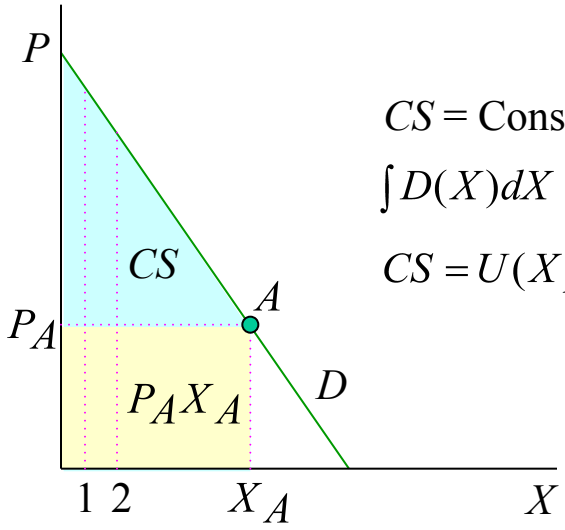
Example

- Suppose marginal cost is a constant, c, and E=2.

Then $\frac{P-MC}{P} = \frac{P-c}{P} = \frac{1}{2} \rightarrow$ p = 2c. That is, the monopoly price is a constant markup over cost. In other words, in this case, if the marginal cost goes up by 1 dollar, the monopoly price increases by 2 dollars.

Welfare Loss from Monopoly

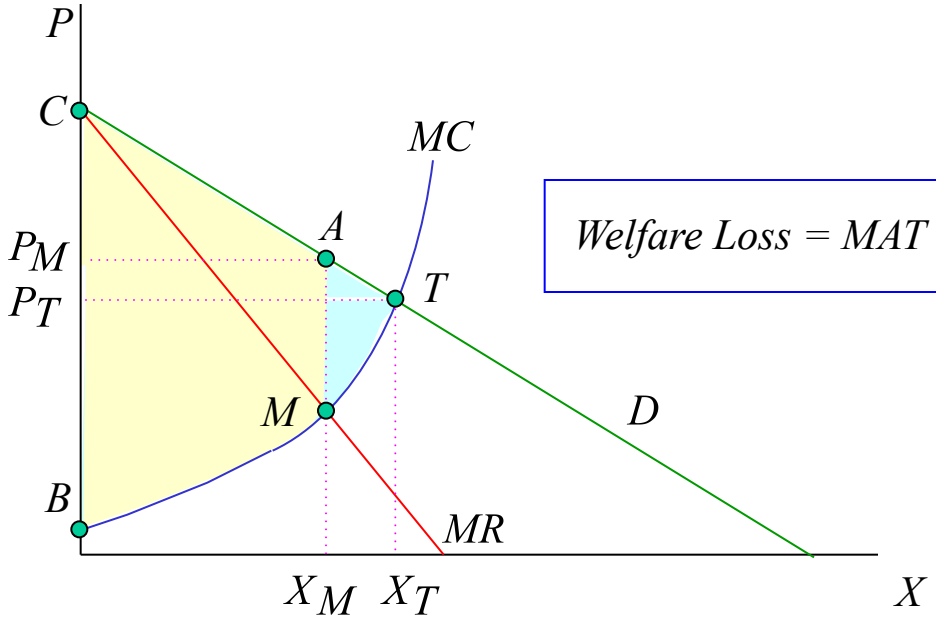




CS = Consumer Surplus

$\int D(X)dX = U(X_A)$

$CS = U(X_A) - P_A X_A$



Welfare Loss = MAT

	M	Comp
CS:	P_M CA	P_T CT
PS:	BP_M AM	BP_T T
TS:	BMCA	BMTC