5 Monopoly

5.1 Lecture 11: Monopoly I

5.1.1 Monopoly profit maximization

- **Monopoly** is a market with only one firm. Firms are price makers, not price takers.

- **Total revenue** is
$$TR = P(Q) \cdot Q$$

- **Average revenue** is given by the demand curve
$$AR = P(Q)$$

- **Marginal revenue** is additional revenue from selling one more unit
$$MR = \frac{\partial TR}{\partial Q}$$

- Monopoly faces downward sloping demand curve and therefore
$$MR = \frac{\partial TR}{\partial Q} = \frac{\partial P(Q) \cdot Q}{\partial Q} = P(Q) + Q\frac{\partial P}{\partial Q}$$
And because
$$MR = P(Q) + Q\frac{\partial P}{\partial Q} < P(Q)$$
Monopolist has to decrease price on all units sold in order to sell one additional unit. This is not the case with a perfectly competitive firm, which cannot influence the price at which it sells. Therefore, MR curve for monopolist is below AR curve (the demand curve).

- A monopoly never produces at the inelastic part of the demand curve
$$MR = P(Q) + Q\frac{\partial P}{\partial Q} = P(1 + \frac{1}{\epsilon_D})$$
for $|\epsilon_D| < 1, MR < 0$.

- To maximize profit in a monopoly, firms produce at $MR = MC$.
$$MR = P(1 + \frac{1}{\epsilon_D}) = MC$$
$$\frac{P - MC}{P} = -\frac{1}{\epsilon_D}$$
is the markup, or measure of monopoly power, which depends on the elasticity of demand. Higher markup means demand is more inelastic.

5.1.2 Welfare effects of monopoly

- Monopolists produce less than the competitive quantity, reducing total surplus and producing deadweight loss.
- Social welfare can be maximized under perfect price discrimination.

5.1.3 TO KNOW – Conceptual Understanding

- Explain why marginal revenue is less than average revenue for a monopolist but not for a competitive firm
- Know why both a monopolist and perfectly competitive firm want to set $MR = MC$
- Explain why a monopolist's market power depends on the elasticity of demand
- Explain why there is deadweight loss (DWL) when a monopolist cannot price discriminate
- Explain why there is no deadweight loss (DWL) when a monopolist can price discriminate

5.1.4 TO KNOW – Graphical and Math Understanding

- Given a cost function and a demand curve, solve for the price and quantity in a market with a monopolist; be sure to check whether the monopolist will want to shut down
- Derive an equation relating the monopolist markup to the elasticity of demand
- Graphically, identify the producer surplus, consumer surplus, and DWL of monopoly in the uniform price case