I. Price discrimination
   A. Motivation
   Firms with monopoly power do not like to leave money on the table. The standard monopolist has two sources of regret. First, even at the monopoly price, some consumers would have been willing to pay even more for the good (region of demand curve to left of monopoly output, region A in Figure 11.1). Raising the price for everyone would result in lower profits (because MR > MC in region A), but what if you could raise the price for some and keep it the same for others? If the monopolist could figure out how to charge one group a higher price (and others the plain vanilla monopoly price) then TR would increase and TC would be unchanged, thus leading to extra profits.

   Second, there are additional consumers who are willing to pay P>MC (region of demand curve to right of monopoly output, region B in Figure 11.1). Lowering the price will not work with these people because MR<MC. But if you could keep the consumers you already have at the monopoly price and add these consumers on the side, profits would grow.

   B. Price discrimination is the practice of selling different prices to different customers for similar goods. Major types include:
      - Same good but different prices (coupons, cosmetics, cars)
      - Price differentials much larger than cost differentials (Purina vs. ProPlan, private floors at hotels, 1st class air travel)
      - Price paid varies with consumption (buy one pizza at $8.99, get second for $3.99)
      - Price paid varies by location (cement in Wake County vs. cement in Sampson County)

   C. Necessary conditions
      1. Monopoly power in each market (limited number of carriers)
      2. Ability to identify each group (Saturday stayover, time of day)
      3. No arbitrage (name on ticket matches photo ID)
D. Third degree price discrimination
Suppose there are two (or more) different segments of customer demand, each with its own demand curve. Possible examples include matinee and evening movies, brand new and 6 month old novels, weekday flights or weekend flights. Elasticity of demand would vary between these segments.

Suppose also that costs of production cannot be separated by market segment. For instance, if you own a movie theatre and decide to show *Harry Potter and the Goblet of Fire* for a week this Thanksgiving, you get charged a flat sum but you still have to staff the theatre and pay the power bill for each showing, whether afternoon or evening. (If costs for each segment were totally separable, then the problem would have the same structure as the standard monopoly problem and you would have MRi = MCi in each segment i.)

The question facing the firm is what price to charge each segment. Let’s look at how an airline such as American might price air travel. Rather than going through more fancy math, let’s apply some common sense principles from earlier in the course. Suppose right now that American has 5 flights to Boston on weekdays and 3 flights on the weekend. It estimates that the 5th weekday flight generates $50,000 in revenue per day and the 3rd weekend flight generates $25,000 per day. Cost of each flight is the same, so this is not a concern for now. Also, suppose American can run charters or schedule most maintenance on weekends; it is not obligated to have the same number of flights on weekends and weekdays.

Q: does this allocation of flights make sense for American? NO! American would be better off scrapping the 3rd weekend flight and moving around its maintenance schedule so that it could schedule 6 flights on weekdays. It would lose $25,000 in weekend revenue but gain close to $50,000 in weekday revenue. This example illustrates a simple decision rule for output (and pricing) by market segment: the firm should adjust its production mix so that MR1 = MR2. The final step is to take cost into account. Profit maximization would dictate that MR = MC. In this situation MC of each flight is probably the same (labor, jet fuel, gourmet meals), so we would end up with

\[ \text{MR1} = \text{MR2} = \text{MC} \]

Pricing strategy would be dictated by the elasticities of demand for the two market segments. Remember that \( MR = P(1 + 1/E_d) \), meaning

\[ P1(1+(1/E1)) = P2(1+(1/E2)) \]

\[ \frac{P1}{P2} = \frac{(1+(1/E2))}{(1+(1/E1))} \]

This looks a bit formidable, but the underlying basis is common sense – customers with the fewest alternatives pay the higher price. To follow the numbers, just imagine that \( E1 = -3 \) and \( E2 = -6 \). In this case we would expect \( P1 > P2 \). Plugging in the values, we get \( \frac{P1}{P2} = \frac{(1+(1/-6))}{(1+(1/-3))} = 0.833/0.667 > 1 \). So \( P1 > P2 \)! We will get the same type of result as long as the absolute value of \( E2 \) is greater than absolute value of \( E1 \). Again,
the common sense side of this is that customers with the least elastic demand (new novels, business travel) pay the higher price.

Graphical analysis (Figure 11.5):
1. Sum MR1 (business) and MR2 (leisure) to get MRT. This shows additional revenue coming from both markets from additional output.
2. Set aggregate output where MRT = MC at QT.
3. Output in market 1 is read off MR1, price for market 1 is read off D1.
4. Output in market 2 is read off MR2, price for market 2 is read off D2

No surprise: less elastic market pays higher price!

Numerical example: look at problem 5, part i, p. 421. The trick is to solve for Q1 and Q2 in the following equations:

\[
\begin{align*}
\text{MR1} &= \text{MC} \\
15 - 2Q1 &= 3 \\
Q1 &= 6 \\
\text{MR2} &= \text{MC} \\
25 - 4Q2 &= 3 \\
Q2 &= 5.5
\end{align*}
\]

Then go back to the demand equations to solve for P1, P2 (P1=9 and P2=14). Then calculate TR, TC, and profits:

\[
\text{Profits} = 9\times6 + 14\times5.5 - (5 + 3(6 + 11.5)) = 91.5
\]

Comparison to perfect competition: here we would have MR1 = MC = 3; ditto for market 2. Result would be Q1 = 12 and Q2 = 11. Pretty big difference!

E. Second-degree price discrimination
This form of price discrimination allows the price paid by each customer to vary with the quantity purchased by that customer, providing “volume discounts” to those who purchase the most. One example would be a lower price (per roll) when you buy 8 rolls of paper towels at once than when you buy a single roll. Another would be for Burger King to sell one Whopper for $1.89 and two Whoppers at $2.49. (Aside: cost savings is an alternative explanation of some quantity discounts.)

Public utilities engage in a practice called block pricing where the customer is charged different amounts at different consumption levels. For instance the first 500 kilowatt hours of electricity used per month might cost 10 cents apiece, whereas the next 500 may cost 7.5 cents and the next 500 cost 5 cents.

This practice allows the firm to transfer more consumer surplus into revenue than it would under single-price monopoly pricing.

F. First-degree price discrimination
In this situation sellers can charge everyone a different price. Leading examples include professions (doctors before Medicare, lawyers, accountants, consultants), car salespersons, and private universities. The ideal – from the monopolist's perspective –
is displayed in Figure 11.2. Each customer would be charged the maximum price that he/she is willing to pay.

Key results:
1. Output would now be same as competitive case, where \( P = MC \). This is because the demand curve becomes the monopolist’s MR curve.
2. This would leave no consumer surplus at all.
3. The monopolist’s profits would go from the standard rectangle (for some reason this is not displayed) to the area between the demand curve and the marginal cost curve.

II. Time-based pricing

A. Intertemporal price discrimination
Most common example is markdowns of retail merchandise. Latest stuff (fashions, high-tech gizmos) is sold at very high prices, but then gradually markdowns occur. Basic idea is to extract maximum consumer surplus from those who cannot wait, folks who have every inelastic demand curves (e.g., those who want to be 1st on the block to have a 60” plasma TV). Costs do not necessarily change, but prices do as this initial demand gets tapped out and the firm wants to reach a larger market. We have seen this with PCs, laptops, VCRs, DVDs, cell phones – you can count on seeing it for HDTVs and Blackberries.

B. Peak-load pricing
Applies to situation where capacity is fixed but subject to rising costs as usage rises. Electric power is classic case, when on a hot day in July that marginal kilowatt hour can be extremely expensive to produce/obtain. If same price is charged in all periods, customers have no reason to ration their demand and CP&L has no incentive to buy or produce those extra kilowatt-hours.

Solution is to charge different prices at different times. You get free weekends on many calling plans today, but once you have used up your bucket of minutes, you pay 5 cents or more per minute on weekdays. Goal of firm would be to try to set MR = MC at every period. The result will be that MC in a peak period will not be the same as MC in an offpeak period, which makes this case a bit different from 3rd degree price discrimination. (Figure 11.8)