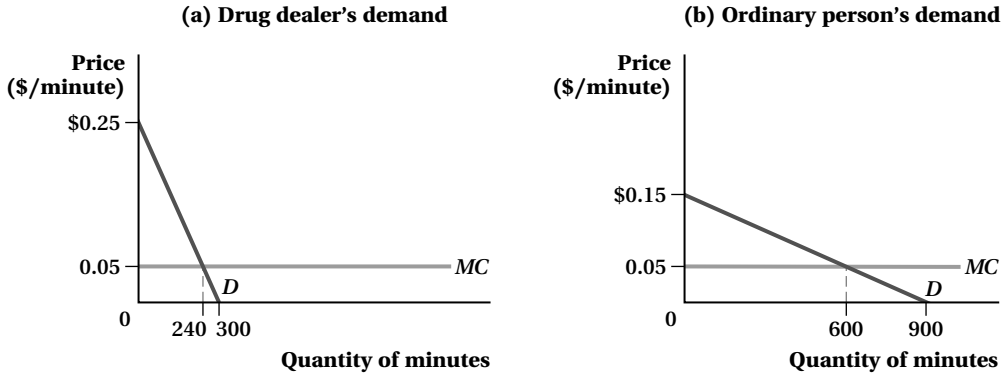
∂ 20. SmacFone is a major provider of pay-by-the-minute, no contract cellphones that are very popular with ordinary consumers. They are also quite popular with drug dealers, who appreciate the anonymity that such phones provide. The demand curves for talking minutes that SmacFone faces from each type of customer are given in the diagrams below. SmacFone's marginal and average total cost of service is 5 cents per minute.



a. Determine the profit-maximizing price and quantity that SmacFone would like to charge each type of consumer, and show it on the appropriate graph. Then, determine the potential profit that SmacFone could generate from each segment.

   Because SmacFone cannot tell whether a new customer is an ordinary person or a drug dealer, it decides to use second-degree price discrimination to separate consumers. SmacFone sets a Plan A price of 15 cents per minute, but offers a special Plan B price of 10 cents per minute if a customer purchases 300 or more minutes.

b. Determine how much consumer surplus ordinary consumers would receive under Plans A and B. Which plan should ordinary consumers choose if they are trying to maximize their surplus?

c. Determine how much consumer surplus drug dealers would receive under Plans A and B. Which plan should drug dealers choose if they are trying to maximize their surplus?

d. Is the plan SmacFone derived incentive compatible? (In other words, will the plan successfully direct drug dealers to Plan A and ordinary consumers to Plan B?) How much profit will SmacFone generate with this set of plans?

e. SmacFone is considering making some adjustments to their plans. One option is to change Plan B to 11 cents per minute with a 240-minute minimum. Determine whether the new plan selection is incentive-compatible. Why doesn't SmacFone simply raise the price to 11 cents without altering the 300-minute minimum? How much profit will the new set of plans generate for SmacFone?

f. Another option that SmacFone is considering is dropping the price of its ordinary service to 14 cents per minute. Determine whether the new plan selection is incentive compatible. How much profit will the new set of plans generate for SmacFone?

g. Why does lowering the price of ordinary service work better at creating an incentive-compatible set of calling plans than raising the price of the large-quantity plan?

h. Suppose that drug dealing is deemed bad for society and the government has developed new technology that would allow SmacFone to elicit each drug dealer's specific willingness to pay for minutes of phone service. An equivalent technology does not exist for ordinary people. The government is considering giving the technology to SmacFone in exchange for a tax payment. Using calculus, determine SmacFone's producer surplus from the drug-dealing market under this technology. How much of this surplus can the government tax while still providing SmacFone with the incentive to use the technology?