

1. A bicycle-repair shop charges the competitive market price of \$30 per bike repaired. The firm's short-run total cost is given by  $STC(Q) = 3Q^2$ .
  - a) What quantity should the firm produce if it wants to maximize profits?
  - b) Draw the shop's total revenue and total cost curves and graph the total profit function on the same diagram. Using your graph, state (approximately) the profit-maximizing quantity.
2. An industry currently consists of 16 producers, all of whom operate with the same short-run total cost curve

$$STC(Q) = \begin{cases} 50 + 10Q + 4Q^2 & Q > 0 \\ 14 & Q = 0 \end{cases}$$

where  $Q$  is the annual-output of a firm. The demand curve is  $D(P) = 140 - 2P$ , where  $P$  is the market price.

- a) What is the equation for the MC?
  - b) What is the equation for ANSC?
  - c) What is the shutdown price for each firm?
  - d) What is the equation for the firm's supply curve?
  - e) What is the equation for the market supply curve?
  - f) Determine the short-run market equilibrium price and quantity.
  - g) Calculate the profit of each firm in this equilibrium.
3. There are 12 identical firms in a perfectly competitive market. They all face short-run total cost:

$$STC(Q) = \begin{cases} F + 9 + 5Q + 1Q^2 & Q > 0 \\ F & Q = 0 \end{cases}$$

where  $F$  is the sunk cost. The market demand is  $D(P) = 180 - 4P$ .

- a) When  $P = 15$ , how much would a firm want to produce to maximize profits?
  - b) When  $P = 15$ , what are the profits for a single firm in terms of  $F$ ?
  - c) What value of  $F$  will ensure that the economic profits of each firm are 0 when  $P = 15$ ?
  - d) What would be the shutdown price for each firm?
  - e) What is the equation for the supply curve for one of these firms.
  - f) What is the equilibrium price when there are 12 firms currently in the market?
  - g) Given that firms get 0 economic profit, when  $P = 15$ . How many firm would be in the market at an equilibrium in which every firm earns 0 economic profit?
4. The propylene industry is perfectly competitive, and each producer has the total cost function  $TC(Q) = 40Q - 18Q^2 + 3Q^3$ . The market demand is  $D(P) = 1800 - 120P$ .

- a) What are the long-run marginal and average cost functions?
  - b) What is the long-run equilibrium price in the market, and how much will each firm produce in equilibrium?
  - c) How many firms are in the propylene market in a long-run perfectly competitive equilibrium, and how much propylene will be supplied by all producers in the market?
5. In a competitive market, there is currently no tax, and the equilibrium price is \$40. the market has an upward-sloping supply curve. The government is about to impose an excise tax of \$5 per unit. In the new equilibrium with the tax, what price will producers receive and consumers pay if the demand curve is (illustrate your answers graphically)
    - a) Perfectly elastic
    - b) Perfectly inelastic
  6. In a perfectly competitive market the market demand curve is given by  $Q = 24 - 2P$  and the market supply curve is given by  $Q = 2P$ .

- a) Find the equilibrium price and quantity demanded.
- b) Find the consumer and producer surplus.
- c) Determine the net economic benefit.

Now, suppose the government imposes a subsidy ( $S$ ) of \$2 per unit.

- d) Find the quantity supplied and demanded with  $S$ .
  - e) Find the consumer and producer surplus with  $S$ .
  - f) Find the total spent by the government with  $S$ .
  - g) What is the DWL with  $S$ ?
7. In a perfectly competitive market, the market demand curve is given by  $Q = 160 - 5P$ , and the market supply curve is given by  $Q = 35P$ .
    - a) Find the equilibrium price and quantity demanded.
    - b) Find the consumer and producer surplus.
    - c) Determine the net economic benefit.
- Now suppose we impose a price ceiling (PC) at  $P = 2$ .
- d) Find the quantity supplied and demanded with PC.
  - e) Find the consumer and producer surplus with PC assuming the rationing is as *efficient* as possible.
  - f) What is the DWL with the efficient rationing?
  - g) Find the consumer and producer surplus with PC assuming the rationing is as *inefficient* as possible.
  - h) What is the DWL with the inefficient rationing?