# CHAPTER 4: PARTIAL EQUILIBRIUM

## Exercise 1

In a perfectly competitive market there are J firms. Each firm produces output q according to an identical cost function $c(q) = k + q^2$, where $k > 0$. Market demand is given by $Q_d = a - p$. Assume $a > 2\sqrt{k}$.

a. Determine the profit-maximizing output of an individual firm.
b. Determine the market price and amount produced by all firms in the short-run.
c. Assume that the long run cost function is $c(q) = k + q^2$, $k > 0$, for $q > 0$ and $c(0) = 0$. Compute the number of firms that are active in this market in the long-run equilibrium (ignoring any integer constraints).

## Exercise 2

A monopolist faces linear demand $p = a - bq$ and has cost $C = cq + F$, where all parameters are positive, $a > c$, and $(a - c)^2 > 4bF$.

a. Solve for the monopolist's output, price, and profits.
b. Calculate the deadweight loss and show that it is positive.

## Exercise 3

"Consumer surplus is an exact measure of consumer welfare." Under which conditions is this statement true? Explain.

## Exercise 4

Consider a market structure with J identical firms with marginal cost $c \geq 0$. Let the inverse market demand be given by $p = a - bQ_d$ for total market output $Q_d$.

a. Compute total surplus, W, as a function of $Q_d$, when each firm produces the same output $Q_d/J$.
b. Compute the maximum potential total surplus W*.
c. In which market structure do we achieve maximum total surplus? Explain briefly.

## Exercise 5

Consider a consumer whose income is $y_0$ and consider an inferior (but not Giffen) good q, whose price falls from $p_0$ to $p_1$ (i.e., $p_0 > p_1$).

a. Define compensating variation (CV).
b. Graphically represent the CV in the space (q, p).