Cost Curves

Question 1 – Cost Curves

The cost function of a firm is:

$$c(y) = \frac{1}{2}y^2 + 2$$

(i) What is the firm's variable cost function $c_v(y)$?

(ii) What is the firm's fixed costs, F?

(iii) What is the firm's average cost function, $AC(y)$?

(iv) What is the firm's average variable cost function, $AVC(y)$?

(v) What is the firm's average fixed cost function, $AFC(y)$?

(vi) What is the firm's marginal cost function, $MC(y)$?

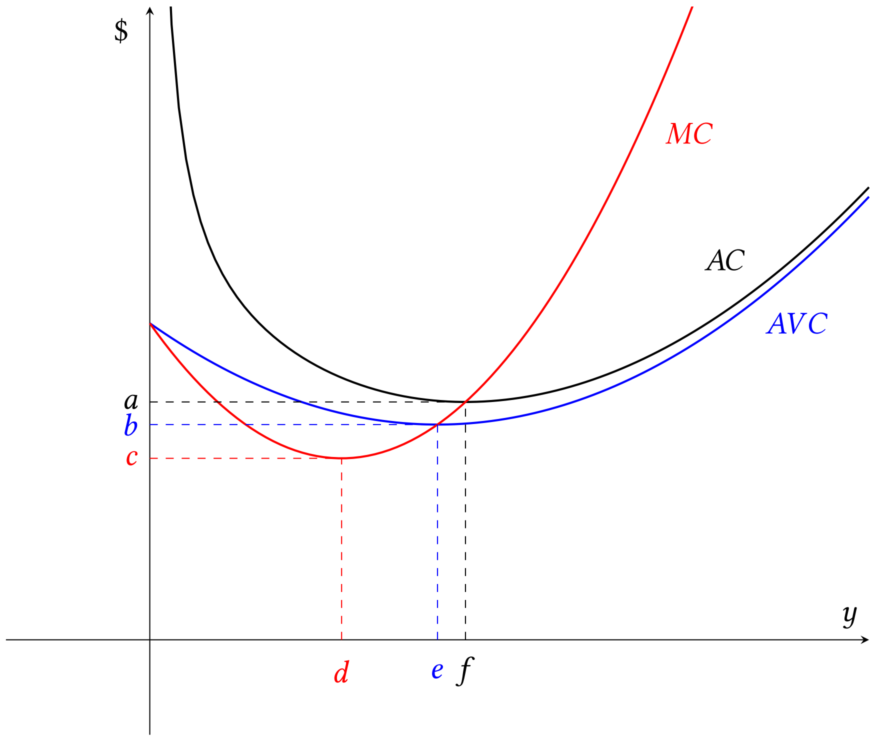
(vii) Verify that the marginal cost curve instersects the average cost curve when the average cost curve is at its minimum. That is, first find the minimum of $AC(y)$. Then secondly find y that solves $MC(y) = AC(y)$.

(viii) Sketch the marginal cost, average cost and average variable cost function on a graph. Label the intersections of the curves with their values on the axes.

Firm Supply

Question 2 – Short-Run and Long-Run Supply

Consider the following marginal cost curve (MC), average cost curve (AC) and average variable cost curve (AVC).



The firm is in the **short run**:

(i) If $p = a$, how much will the firm produce (in terms of d, e and f)?

(ii) If $p = a$, what will the firm's profit be (in terms of a, b, c, d, e and f)?

(iii) If $p = b$, how much will the firm produce (in terms of d, e and f)?

(iv) If $p = b$, will the firm be making a profit or a loss?

(v) If $p = c$, how much will the firm produce (in terms of d, e and f)?

Now the firm is in the **long run**:

(vi) If $p < a$, what will the firm do and why?

Industry Supply

Question 3 – Industry Supply

Consider a competitive industry where every firm has the same cost function $c(y) = \frac{1}{2}y^2 + 1$. The market demand function is $D(p) = 220 - 10p$.

(i) What is the supply function $S_i(p)$ for an individual firm in the industry? Hint: use the firm's optimality condition, $p = MC(y)$.

(ii) If there are 100 firms in the industry, what will the industry supply curve, $S(p)$, be?

(iii) What will the (short-run) equilibrium price be?

(iv) How many units does the industry as a whole produce?

(v) How many units does a single firm produce?

(vi) What profit does each firm make?

(vii) Will any firms want to enter or exit this industry in the long run?

Equilibrium

Question 4 – Taxation and Supply and Demand Shifts

The demand and supply functions for a particular good in the market are given by:

$$D(p) = 12 - 2p$$

$$S(p) = 2 + 3p$$

(i) Find the equilibrium price and quantity.

Now the government imposes a per-unit tax (a quantity tax) of 1 on the good.

(ii) Find the price the buyers pay, the price sellers receive and the new equilibrium quantity.

(iii) What portion of the tax do consumers pay and what portion of the tax do sellers pay?

Now suppose we are back to the situation **before the tax**. A recent policy change lowered income tax. This means that consumers now have more income. Suppose this means that all consumers are now willing to pay an extra $5 per unit of the good.

(iv) How does this affect the equilibrium price and quantity?