

PERFECT COMPETITION (PURE COMPETITION)

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PRACTICE PROBLEM

Consider the short run cost curve of product X,

$$C = q^3 - 4q^2 + 20q + 40. \quad (1)$$

1. Fixed cost is 40.

2. Average fixed cost is: $\frac{40}{q}$.

3. Variable cost is:

$$VC = q^3 - 4q^2 + 20q.$$

4. Marginal cost is:

$$MC = 3q^2 - 8q + 20. \quad (2)$$

5. Average variable cost is:

$$AVC = \frac{q^3 - 4q^2 + 20q}{q} = q^2 - 4q + 20. \quad (3)$$

6. What is the shutdown price? The shutdown price is equal to the minimum of AVC.

$$AVC' = 2q - 4 = 0, \text{ or } q = 2. \quad (4)$$

SOC is

$$AVC'' = 2 > 0,$$

Thus, AVC reaches its minimum at $q = 2$. Average variable cost at that point is:

$$AVC(2) = 2^2 - 4 \times 2 + 20 = 16.$$

Thus, the shutdown price is \$16.

7. What is the firm's supply when price is \$20?

$$p = 20 = 3q^2 - 8q + 20 = MC, \text{ or}$$
$$3q^2 - 8q = q(3q - 8) = 0.$$

Thus, either $q = 0$ or $q = 8/3$. (Choose the larger volume, because when MC is U-shaped, it is decreasing at a lower output and is increasing at a larger output).

8. What is the firm's profit?

$$\pi = pq - c(q) = 20 \times \frac{8}{3} - \left(q \left(\frac{8}{3} \right)^3 - 4 \left(\frac{8}{3} \right)^2 + 20 \frac{8}{3} + 40 \right).$$

9. What is the firm's output when price falls to \$10?

Since p is less than the shutdown price, optimal output is zero.

Amphitheater in Delphi, Greece. The priestess at Delphi specialized in forecasting the future. Such predictions were called oracles. Recently, archeologists found in Anyang (the

last capital of Shang Dynasty about 10th century, BC)
evidence of Chinese practicing oracles during that period.

