

Questions

5. Suppose a perfectly competitive firm has the short-run cost function $C = 125 + q^2$. Use the derivative formula or marginal cost to determine the firm's output level and profit at prices of \$30 and \$20. At what price does the firm reach the shut-down point?
9. If each competitive firm in an industry has the short-run cost function $C = 50 + 5q + q^2$, and the market price is \$35, what is the profit-maximizing output level for each firm? What is the total revenue? What are the profits?
10. Suppose, in Question 9, that fixed costs were \$250 instead of \$50. How does this change affect the firm's output decision and profits? Should the firm continue to operate?

Answers

5. The marginal cost equation is $MC = 2q$. When $p = \$30$, $q^* = 15$, $p = \$100$. When $p = \$20$, $q^* = 15$,
 $p = -\$25$. The firm should keep operating since $TR > TVC$. The firm should shut down when $AVC > MC$ (normally, the minimum point of AVC). In this case, however, variable cost is linear with slope of 1, and MC is linear with slope of 2, making all positive output levels above the shut-down point.
9. Set $MC = MR$ and solve.
 $MC = 2q + 5$
 $MR = 35$
 $2q + 5 = 35$
 $q^* = 15, TR = 525, TC = 350, p = 175$
10. As in Question 9, set $MC = MR$ and solve. Output is unchanged, but profits fall.
 $MC = 2q + 5$
 $MR = 35$
 $2q + 5 = 35$
 $q^* = 15, TR = 525, p = -25$.
Because losses are less than total fixed costs. The firm should continue producing.