Economics 11 Caltech Spring 2010

QUIZ 4

Definition (use words not equations)
3 lines or less
1pt Please define: Marginal cost.

The cost of producing an additional unit of output

Word problem
2pts True or False: Please explain each question in a few sentences.

How does a profit-maximizing firm decide how much to produce if it takes all prices as given? Why does the same firm shut down if the price falls below the minimum average variable cost of production?

The firm sets quantity so that the output price equals marginal cost, and it chooses its inputs so that the ratio of input prices equals the ratio of marginal product.

The firm shuts down if the price falls below the minimum average variable cost of production, because it is not even covering the variable costs of production, so even if all the fixed are sunk it can't make any money.

Technical problem
3 pts

- Suppose a company has total cost given by \( rK + 2 \frac{q^2}{K} \), where capital \( K \) is fixed in the short-run.
  - For a given quantity \( q_0 \), give a formula for the level of capital that minimizes total cost?
  - Suppose capital \( K \) can be adjusted in the long-run. Does this company have an increasing return to scale, decreasing returns to scale or constant returns to scale?

Min TC have to minimize total cost with respect to capital (the variable input

\[ \Rightarrow \frac{\partial C}{\partial k} = 0 \Rightarrow -2q^2/k^2 = 0 \text{ or } k = \frac{2^{0.5} q}{r^{0.5}} \]

\( C(q) = (2r)^{0.5} q + (2r)^{0.5} q \text{ or } C(q) = 2(2r)^{0.5} q \)

Costs are linear in \( q \) so the firm has constant returns to scale.