

4. The production function of a coal-mining firm is given by $X=3L^{0.5}K^{0.5}$, where X denotes million tons per year, and L and K denote the labor and capital inputs in millions of hours. The long run rental prices of L and K are $W_L^0 = \$4$ and $W_K^0 = \$9$. The firm is a price taker and the market price of coal is \$4 per ton. (20%)
- In the short-run the firm decides to maintain its capital input fixed at $K^0 = 4/3$ (million machine hours). Derive the firm's short-run total and marginal cost curves
 - Derive the firm's long-run total and marginal cost curves
 - What is the optimal output (sales) of coal in the short-run?
 - If the firm were the only coal producer and the market demand for coal were given by $P = 20 - 2X$, what would be the firm's maximum sales of coal in the long-run? Would this quantity be its optimal sales?
5. To help you evaluate the role of prices in a decentralized market economy consider the following question: (10%)

The subway authority in N.Y.C. has been in the "red" between 1960 and 1968, with revenues falling short even of the salaries paid to token sellers and the cost of maintaining token booths and related devices. One suggestion made at the time was to abolish any token sales, thus making subway rides free of charge. Would this proposal have helped the subway authorities overcome its deficits? Would it have helped the authority become "profitable" in the long run? How the overall economy is going to be influenced by this proposal?