Problem 1: A firm is on a competitive market, i.e. takes price of the output as given. Production function is given by $f(x_1, x_2) = x_1^{1/4} x_2^{1/4}$, prices of inputs are $w_1 = 4$, $w_2 = 4$ and price of output is p = 1. Find the profit maximizing level of output using:

(a) Profit-maximization approach

(b) Cost-minimization approach

Problem 2: Take the set-up from the previous problem. Apart from that the firm has to buy certain equipment before it starts the production. This equipment cost 2000. Compute: variable costs (VC), fixed costs (FC), average variable costs (AVC), average fixed costs (AFC), average costs (AC) and marginal costs (MC).

Problem 3: The production function is $Q = f(L, K) = 100KL$, $w = 300$, and $r = 1200$. What are the total cost of the firm if the output is $Q = 1600$?

Problem 4: The production function is $Q = f(L, K) = K^2 L$. Draw isoquants corresponding to $Q = 5$ and $Q = 10$ and isocost for $w = 1$, $r = 2$, and $C = 6$.

Problem 5: Total cost function of an individual firm facing perfect competition is given by relation:

$$TC(Q) = Q^3 - 20Q^2 + 150Q$$

The market price is equal to \$22. Find the optimal level of production of this firm. What is its profit/loss? Draw your solution in a graph.

Problem 6: Total cost function of an individual firm facing perfect competition is given in short run by relation:

$$TC(Q) = \frac{Q^3}{3} - 2Q^2 + 5Q$$

(a) Short run. Calculate the individual short run supply of this firm.

(b) Short run. Calculate the optimum of this firm if market price is P=10CZK? (P*; Q*; and corresponding profit/loss).

(c) Long run. Suppose now, that the same cost function applies to the long run and this is a representative firm of industry. Calculate the long run equilibrium market price (P_M^*) and corresponding quantity produced by one firm (Q*).

(d) Long run. What will be the total number of firms in industry given that total quantity demanded is 30?