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: Monopoly: A monopolist can produce at constant average and marginal costs of $AC = MC = 5$. The firm faces a market demand curve given by $Q^D = 53 - P$.

(a) Calculate the profit-maximizing price-quantity combination for the monopolist. Also calculate the monopolists profits and consumer surplus.

(b) What output level would be produced by this industry under perfect competition if every firm could produce at the same average and marginal cost as the monopoly?

(c) Calculate the consumer surplus obtained by consumers in part (b). Show that this exceeds the sum of the monopolists profits and consumer surplus received in part (a). What is the value of the deadweight loss from monopolization?

Problem 4: Suppose that a monopolist faces two markets with demand curves given by:

$$D_1(p_1) = 100 - p_1$$
$$D_2(p_2) = 100 - 2p_2$$

Assume that the monopolist's marginal cost is constant at $20 a unit. If it can price discriminate, what price should it charge in each market in order to maximize profits? What if it can't price discriminate? Then what price should it charge?