1. *Depreciation Principles.* At a cost of $1000, an electric utility can build a nuclear power station that will last two periods and provide power at a zero marginal cost. The market demand for electricity each period is completely inelastic at 100 units. At the beginning of the second period, new solar technology will become available that can produce electricity at a cost of $4 per unit. However these devices only last for one period. For simplicity, assume that real and nominal interest rates are zero: i.e., \( s = r = 0 \). (Thus you don’t have to worry about discounting.)

(a) Suppose the utility is regulated by a Commission that insists upon using straight line depreciation to determine allowable rates. Explain in detail what would happen in this market if entry of solar power producers is allowed. (HINT: What would be the Book Value of the nuclear power plant at the beginning of period 2? What would be the true *economic* value then?)

(b) What regulated, break-even prices would you set? Explain your answer.

2. *Peak Load Pricing.* An electric utility faces a 12 hour peak (period 1) demand for electricity and a 12 hour off-peak (period 2) demand every day. The demands for electricity in each of these two periods are given by \( P_1 = 110 - 3y_1 \) and \( P_2 = 60 - 2y_2 \). Providing electric power involves joint costs. The amount of capacity, \( X \), must be large enough to serve the larger of \( y_1 \) or \( y_2 \), but, once provided, it is available to serve the other period as well. Capacity costs $50 per unit. Finally, in order to produce a unit of electricity in either period, one unit of capacity must be combined with $10 worth of fuel.

(a) As an economic consultant to the commission which regulates this utility, you are asked to determine the economically efficient (socially optimal) values for \( P_1 \), \( P_2 \), \( y_1 \), \( y_2 \) and \( X \).

(b) The commission presently believes that all users ought to pay the same price for electricity, but has come under increasing pressure to use peak-load pricing, as in part (a). The commission now orders the firm to charge \( P_1 = P_2 = $50 \). Determine how much dead weight loss results from this “policy of equality.”

(c) Explain why, in this particular case, none of the interested parties (i.e., the electric utility, peak users, or off-peak users) should object to the change from the prices in (b) to those you calculated in (a).