Practice Questions on Optimization 1

1) Suppose a company sell Q (= 100000) units of the product over a given year at a fixed price with demand spread evenly over the year. Production cost per run is a linear function of number of units produced per run. Inventory cost is proportional to number of units produced per run.
   a) Formulate the optimization problem for minimizing the cost.
   b) Obtain the analytical expression for optimal number of units produced per run.
   c) Also, check whether the obtained optimum is indeed minimum.
   d) If fixed cost factor for production cost is 10000, variable cost factor for production cost is 4, and cost factor for inventory cost is 1, calculate the number of units produced per run.
   e) Can you suggest any improvement in the problem definition?
2) For a data given in the table, (a) fit the curve with the equation $y = a_0 + a_1 e^{2z} + a_2 e^{-2z}$. (b) Find the constants a_1 and a_2, when a_0 = 0. (c) Suppose the objective is to fit $y = b_1 z e^{-b_2 z}$, find b_1 and b_2.

z_i	1	2	3	4
y_i	2	4	4	2