Application of KKT Conditions

For a problem in the following form,

$$\text{Min} \quad f(\mathbf{x}) \tag{1}$$
$$\text{s.t.} \quad g_i(\mathbf{x}) - b_i \geq 0 \quad i = 1, \ldots, k \tag{2}$$
$$\quad g_i(\mathbf{x}) - b_i = 0 \quad i = k+1, \ldots, m \tag{3}$$

A) Give the KKT necessary conditions, explaining each equation.

        Equation   Explanation

B) A cylindrical storage tank is to be constructed for which the following costs apply:

Metal for sides	$30.00/sq. ft.
Concrete base and metal bottom	$37.50/sq. ft.
Top	$7.50/sq. ft.

The tank is to be constructed with dimensions such that the cost is a minimum for whatever capacity is selected. One possible approach to selecting the capacity is to build the tank such that an additional cubic foot of capacity costs $8. (Note this does not mean $8 per cubic foot average for the entire tank.) Find the optimal diameter and height of the tank.