

Q 5.3

$$L(x) = a(x_1 + x_2)^2 + b(x_1 - x_2)^2$$

$$\frac{\partial L}{\partial x_1} = 2a(x_1 + x_2) + 2b(x_1 - x_2) = 0 \quad (1)$$

$$\frac{\partial L}{\partial x_2} = 2a(x_1 + x_2) - 2b(x_1 - x_2) = 0 \quad (2)$$

$$\nabla_x L = \begin{bmatrix} \frac{\partial L}{\partial x_1} & \frac{\partial L}{\partial x_2} \end{bmatrix}$$