a.) Stationary: $\left(\frac{\partial L}{\partial Q_1}, \frac{\partial L}{\partial Q_2}\right) = 0$

$$\therefore \frac{\partial L}{\partial Q_1} = 1 + 2\lambda Q_1 \quad , \quad \frac{\partial L}{\partial Q_2} = 2 + 8\lambda Q_2$$

$$\therefore \left[1 + 2\lambda Q_1 \; , \; 2 + 8\lambda Q_2\right] = 0$$

b.) Complementary slackness:

$$\lambda\left(Q_1^2 + 4Q_2^2 - 4\right) = 0$$

c) Primal feasibility:

$$Q_1^2 + 4Q_2^2 - 4 \leq 0$$

d.) Dual feasibility:

$$\lambda \geq 0$$

Ans.