$$2\theta_2^2 - 1 = 0$$

$$\boxed{\theta_2 = \pm \frac{1}{\sqrt{2}}} \quad \text{——— (4)}$$

Since $\theta_1 = 2\theta_2$

$$\boxed{\therefore \theta_1 = \pm \sqrt{2}} \quad \text{——— (5)}$$

and from (1), $\boxed{\lambda = \frac{-1}{2\theta_1} = \mp \frac{1}{2\sqrt{2}}}$ ——— (6)

$\therefore$ the values of $(\theta_1, \theta_2, \lambda)$ are –

$$\cancel{\left(\frac{1}{\sqrt{2}}, \sqrt{2}\right.} = \left(\sqrt{2}, \frac{1}{\sqrt{2}}, -\frac{1}{2\sqrt{2}}\right) \text{ or } \left(-\sqrt{2}, -\frac{1}{\sqrt{2}}, +\frac{1}{2\sqrt{2}}\right)$$

$\because$ from Dual feasibility, $\lambda \geq 0$

$$\therefore (\theta_1, \theta_2, \lambda) = \left(-\sqrt{2}, -\frac{1}{\sqrt{2}}, +\frac{1}{2\sqrt{2}}\right)$$

and the value of $f(\theta_1, \theta_2)$ at $\left(-\sqrt{2}, -\frac{1}{\sqrt{2}}\right)$ is –

$$f(\theta_1, \theta_2) = -\sqrt{2} + 2 \times \left(-\frac{1}{\sqrt{2}}\right) = -\sqrt{2} + (-\sqrt{2}) = -2\sqrt{2} \quad \underline{\text{Ans}}.$$