

$$\begin{aligned} L &= \int_a^b \sqrt{r^2 + (dr/d\theta)^2} d\theta = \int_0^{2\pi} \sqrt{(e^{3\theta})^2 + (3e^{3\theta})^2} d\theta \\ &= \int_0^{2\pi} \sqrt{e^{6\theta} + 9e^{6\theta}} d\theta = \int_0^{2\pi} \sqrt{10e^{6\theta}} d\theta \\ &= \sqrt{10} \int_0^{2\pi} e^{3\theta} d\theta = \frac{\sqrt{10}}{3} [e^{3\theta}]_0^{2\pi} = \frac{\sqrt{10}}{3} (e^{6\pi} - 1) \end{aligned}$$