

1. 3 Find the length of the parametric curve.

$$x = 2t + 4, \quad y = 3t - 1, \quad 0 \leq t \leq 2$$

$$x' = 2 \quad y' = 3 \quad ds = \sqrt{4 + 9} \, dt$$

$$s = \int_0^2 \sqrt{13} \, dt = 2\sqrt{13}$$

2. 4 Find the length of the polar curve.

$$r = e^{2\theta}, \quad 0 \leq \theta \leq \pi$$

$$r' = 2e^{2\theta}$$

$$ds = \sqrt{e^{4\theta} + 4e^{4\theta}} \, d\theta \\ = e^{2\theta} \sqrt{5} \, d\theta$$

$$s = \sqrt{5} \int_0^{\pi} e^{2\theta} \, d\theta = \frac{\sqrt{5}}{2} e^{2\theta} \Big|_0^{\pi} = \frac{\sqrt{5}}{2} (e^{2\pi} - 1)$$

3. 3 Carefully sketch the polar curve  $r = 1 + 2 \sin \theta$ .

