$$s = \begin{cases} \displaystyle\int_a^b \sqrt{1 + y'^2}\,\mathrm{d}x & y = f(x) \\[3ex] \displaystyle\int_{t_1}^{t_2} \sqrt{\dot{x}^2 + \dot{y}^2}\,\mathrm{d}t & x = f(t); y = f(t) \\[3ex] \displaystyle\int_{\varphi_1}^{\varphi_2} \sqrt{\left(\frac{\mathrm{d}r}{\mathrm{d}\varphi}\right)^2 + r^2}\,\mathrm{d}\varphi & r = f(\varphi) \end{cases}$$