# Chapter 9
# Technology Exercises

**91.** Find the equation of the graph of $r = 1 - 2\cos\theta$ after a clockwise rotation by $\pi/4$ radians. Name the resulting curve and use a graphing utility to sketch it. (See Exercise 73 in Section 9.3.)

**92–93** Use a graphing utility to sketch the given curve for various values of the parameter(s) and explore the effects on the shape of your graph.

**92.** $r = \theta\cos k\theta$

**93.** $x = \pm a\cos^{2/n} t, \quad y = \pm b\sin^{2/n} t, \quad a, b, n > 0$ (Lamé curves)

**94–95** Use a graphing utility to sketch the curve and then find all horizontal and vertical tangent lines. Confirm your results by paper and pencil calculations.

**94.** $x = t^3 - t, \quad y = t^2 + 1, \quad -2 \le t \le 2$

**95.** $r = 2\sin 2\theta, \quad 0 \le \theta \le \pi/2$

**96–97** Use a graphing utility to sketch the region enclosed by the given curve and find its area.

**96.** $x = t\sin t, \quad y = \sin 2t, \quad 0 \le t \le \pi$

**97.** Inner loop of $r = 2 - 3\cos\theta$

**98–99** Use a graphing utility to approximate the arc length of the curve with the given parametrization.

**98.** $x = \sin 2t, \quad y = \sin t, \quad 0 \le t \le \pi$

**99.** $r = \cos(2\sin\theta), \quad 0 \le \theta \le 2\pi$

**100–101** Use a graphing utility to approximate the surface area of the solid obtained by rotating the given curve about the indicated axis.

**100.** $(t^3 - 3t, t^2 - 2), \quad 0 \le t \le \sqrt{3}$; about the $y$-axis

**101.** $r = 3\sin 2\theta, \quad \pi/4 \le \theta \le \pi/2$; about the polar axis