

## Section 6.3: Arc Length

These notes reflect material from our text, *Calculus, Concepts and Contexts, Third Edition*, by James Stewart, published by Brooks/Cole, Pacific Grove, CA, 2005.

*Key points from Stewart, Section 6.3: Length of a smooth curve.*

### Concepts

**Theorem.** (*Arc Length Formula for Smooth Curves*) The arc length of a smooth curve

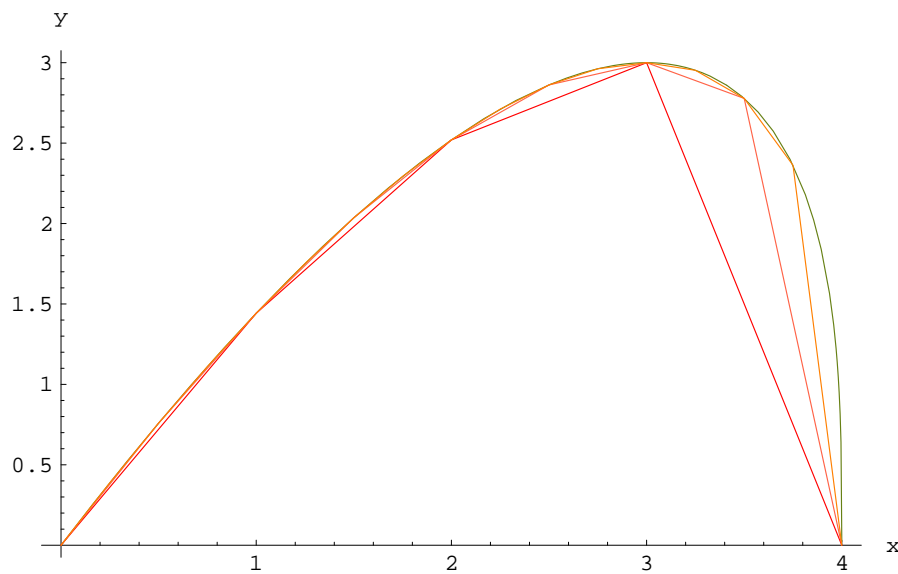
$$r(t) = (x(t), y(t)), \quad a \leq t \leq b,$$

is given by

$$L = \int_a^b \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} dt.$$

**Corollary.** (*Arc Length Formula for Graphs*) If a smooth curve is presented as the graph of a function  $y = f(x)$ , for  $a \leq x \leq b$ , then the arc length formula becomes

$$L = \int_a^b \sqrt{1 + (f'(x))^2} dx.$$



*Fig. Arc Length.*

### Exercises

*Exercises for Section 6.3, pp 465–466:* 1, 3, 5, 7, 15 (inscribed polygons), 17, 19 (CAS), 21 (hawk), 22 (kite), 23 (corrugated roofing)