

Section 3.5: The Chain Rule

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 3.5: The Chain Rule.

The Derivative

Recall that if $f(x)$ is a function, the *derivative at $x = a$* is given by

$$f'(a) = \lim_{h \rightarrow 0} \frac{f(a+h) - f(a)}{h}$$

provided that this limit exists.

The Derivative of a Composition of Two Functions

Chain Rule

$$\frac{d}{dx}(f(g(x))) = f'(g(x)) \cdot g'(x)$$

$$(f \circ g)' = f' \circ g \cdot g'$$

$$\frac{dz}{dx} = \frac{dz}{dy} \frac{dy}{dx}$$

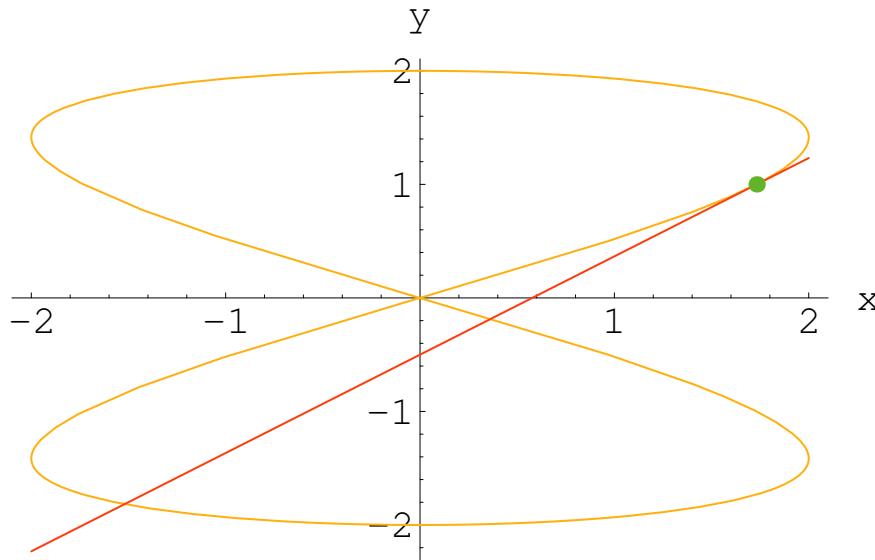


Fig. $dy/dx = \frac{dy/dt}{dx/dt}$.

Exercises

Exercises for Section 3.5, pp 228–231: 5, 9, 15, 19, 25, 29, 36, 37, 43, 45, 46, 61 (cepheid variable), 63 (friction), 64 (rumor), 68 (exponential population growth), 73 (parametric curves), 76 (CAS)