Section 3.8: Linear Approximations and Differentials

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 3.8: Tangent line approximation.

Concepts

The **tangent line approximation** or **linear approximation** to the curve $y = f(x)$ at the point $P(a, f(a))$,

$$linearApprox(x) = f(a) + f'(a)(x - a).$$

Accuracy of the tangent line approximation.

The **quadratic approximation** to the curve $y = f(x)$ at the point $P(a, f(a))$,

$$quadraticApprox(x) = f(a) + f'(a)(x - a) + \frac{1}{2}f''(a)(x - a)^2.$$

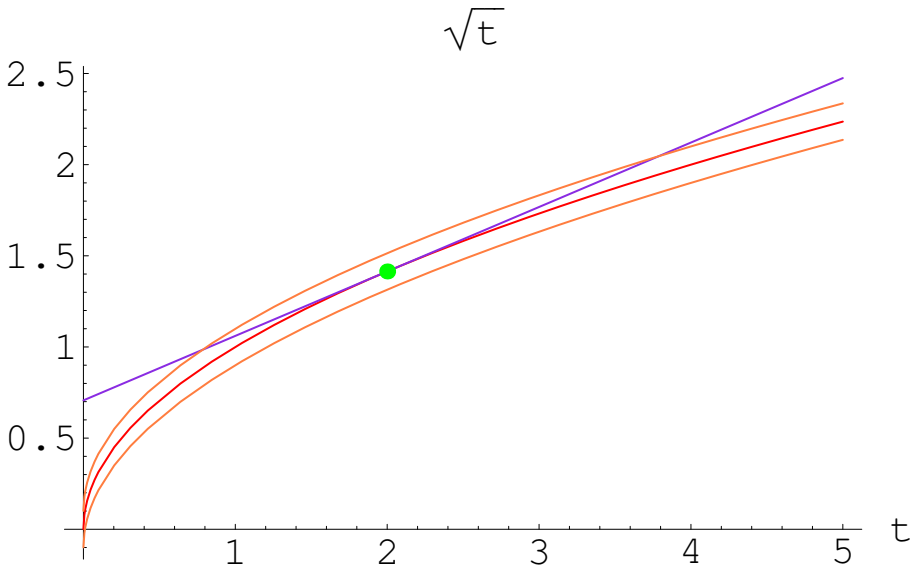

Fig. Accuracy of a linear approximation.

Exercises

Exercises for Section 3.8, pp 252–253: 1 (turkey), 2 (atmospheric pressure), 3 (Australia's population), 4 (Nepal's population), 9 (linear approximation), 13 (accuracy), 24 (differential), 30 (paint), 31 (Poiseuille's Law)