

Section 4.2: Maximum and Minimum Values

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 4.2: Finding maxima and minima; closed interval method.

Concepts

Absolute maximum or global maximum and absolute minimum or global minimum of a function f over a domain D ; relative maximum and relative minimum of f over D ; extreme values of f over D .

Extreme Value Theorem. *If the function f is continuous over a closed interval $[a, b]$, then f attains its maximum and minimum values on $[a, b]$.*

Critical numbers, critical points.

Fermat's Theorem. *If the function f has a local maximum or minimum at the point c , and if $f'(c)$ exists, then $f'(c) = 0$.*

The **closed interval method** for finding the extreme values (absolute maximum and absolute minimum) of a continuous function f over a closed interval $[a, b]$.

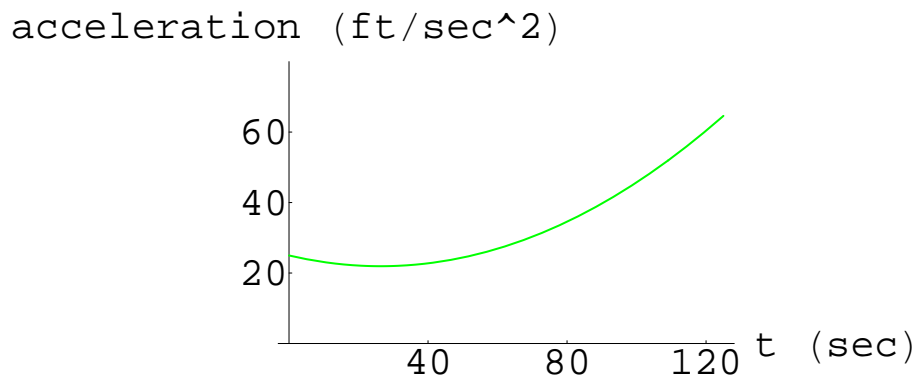


Fig. Acceleration of the space shuttle Discovery during the first 120 seconds of the launch of the Hubble Space Telescope on April 24, 1990.

What does the Extreme Value Theorem say about $a(t)$ over the interval $[0, 120]$?

Exercises

Exercises for Section 4.2, pp 274–277: 2, 3, 6, 9, 21, 27, 39, 43, 55 (density of water), 57 (food-price index), 58 (space shuttle), 59 (trachea)