Curve Sketching

Lecture 29
Section 3.3

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Objectives

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- Use information derived from $f(x)$, $f'(x)$, and $f''(x)$ to sketch the graph of $y = f(x)$.

Vertical Asymptotes

Definition (Vertical Asymptote)

The graph of a function $f(x)$ has a **vertical asymptote** at $x = c$ if

$$\lim_{x \to c^-} f(x) = +\infty \text{ or } -\infty$$

and/or

$$\lim_{x \to c^+} f(x) = +\infty \text{ or } -\infty.$$

Horizontal Asymptotes

Definition (Horizontal Asymptote)

The graph of a function $f(x)$ has a **horizontal asymptote** $y = b$ if

$$\lim_{x \to -\infty} f(x) = b$$

or

$$\lim_{x \to +\infty} f(x) = b.$$

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- The x-intercepts and the y-intercepts.

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- The vertical and horizontal asymptotes.

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- Where $f(x)$ is increasing and where it is decreasing.

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- The relative extreme values.

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- The relative extreme values.
- Where $f(x)$ is concave upward and where it is concave downward.

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- The x-intercepts and the y-intercepts.
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- Where $f(x)$ is increasing and where it is decreasing.
- The relative extreme values.
- Where $f(x)$ is concave upward and where it is concave downward.
- The inflection points.