How can we draw a reliable graph of a function without a calculator?

Quick Check

Find the horizontal and vertical asymptotes of the following function, if any.

$$f(x) = \frac{x}{\sqrt{x^2 - 9}}$$

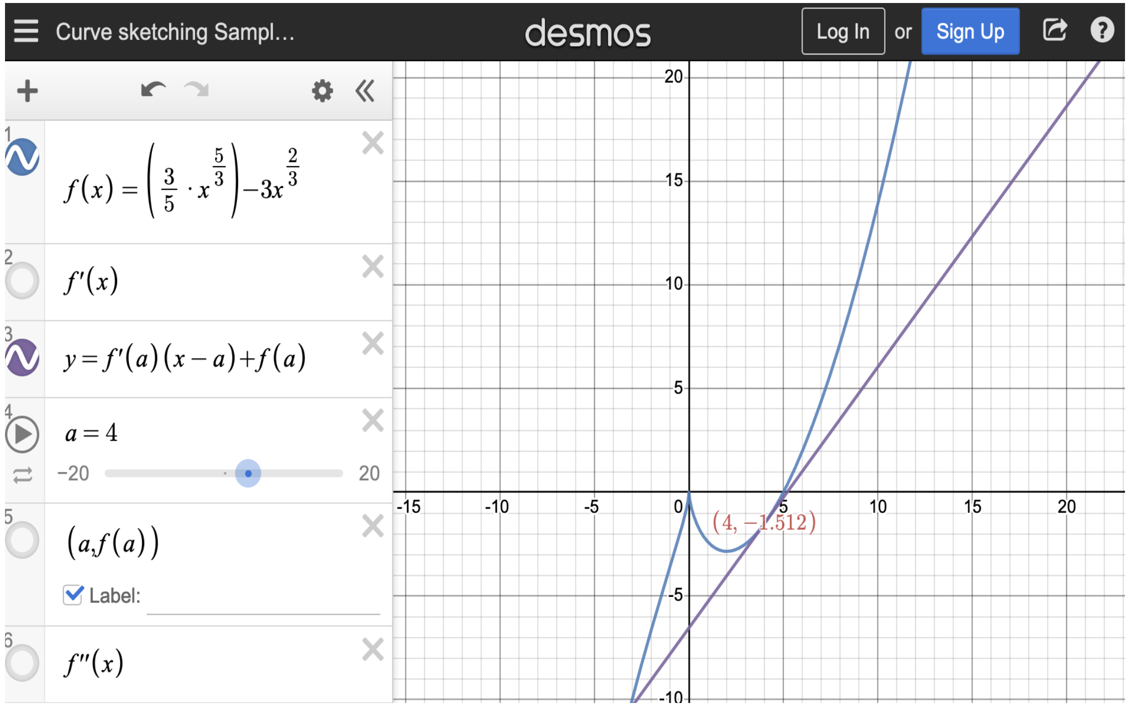
Sketching - Visual Practice

1 Handout - Data to Graph

Domain	$(-\infty, \infty)$
Intercepts	y-intercept: 1
Symmetry	None
Asymptotes	None
Intervals where f is $\nearrow$ or $\searrow$	$\nearrow$ on $(-\infty, 0)$ and on $(2, \infty)$; $\searrow$ on $(0, 2)$
Relative extrema	Rel. max. at $(0, 1)$; rel. min. at $(2, -3)$
Concavity	Downward on $(-\infty, 1)$; upward on $(1, \infty)$
Point of inflection	$(1, -1)$

Domain	$(-\infty, 0) \cup (0, \infty)$
Intercepts	x-intercept: 1
Symmetry	None
Asymptotes	x-axis; y-axis
Intervals where f is $\nearrow$ or $\searrow$	$\nearrow$ on $(0, 2)$; $\searrow$ on $(-\infty, 0)$ and on $(2, \infty)$
Relative extrema	Rel. max. at $(2, 1)$
Concavity	Downward on $(-\infty, 0)$ and on $(0, 3)$; upward on $(3, \infty)$
Point of inflection	$(3, \frac{8}{9})$

2 Handout + Desmos - Graph to Data



Sketching - Algebraic Practice

Sketch the curve $f(x) = \dfrac{2x^2}{x^2 - 1}$.

1. Find the domain of f.
2. Find the $x-$ and $y-$ intercepts of f.
3. Determine whether the graph of f is symmetric to $y-$axis or the origin.
4. Find the horizontal and vertical asymptotes of f.
5. Find the intervals on which f is increasing or decresing.
6. Find the relative extrems of f.
7. Determine the concavity and points of inflection of f.
8. Combine the information gathered in steps $1 - 7$ to sketch the graph of f.

Sketching - Algebraic Practice

1 Analyze and sketch the graph of $y = \dfrac{2x^2 - 8}{x^2 - 16}$.

2 Analyze and sketch the graph of $f(x) = 2x^{5/3} - 5x^{4/3}$