

## Summary Of Curve Sketching

### Guidelines for Analyzing the Graph of a Function

1. Determine the domain and range of the function
2. Determine the intercepts, asymptotes, and symmetry of the graph.
3. Locate the x-values for which  $f'(x)$  and  $f''(x)$  either are zero or do not exist. Use these results to determine extrema and points of inflection.

Here are a couple examples:

#### Ex 1: Rational Function

$$f(x) = \frac{x^2 - 2x + 4}{x - 2}$$

$$f'(x) = \frac{x(x - 4)}{(x - 2)^2}$$

$$f''(x) = \frac{8}{(x - 2)^3}$$

x-intercepts: none

y-intercepts:  $(0, 2)$

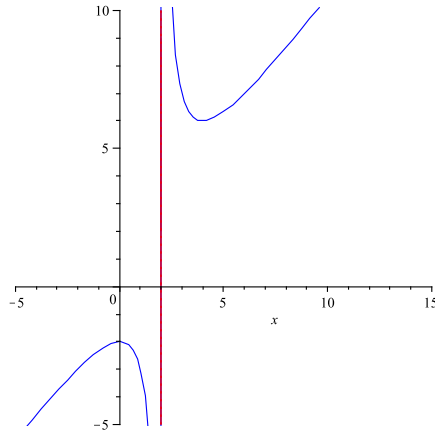
Vertical asymptotes:  $x = 2$

Horizontal asymptotes: none

Critical values:  $x = 0, x = 4$

Points of Inflection: none

Domain: all real numbers except  $x = 2$



Ex 2: Trigonometric Function

$$f(x) = \frac{\cos(x)}{1 + \sin(x)}$$

$$f'(x) = \frac{1}{1 + \sin(x)}$$

$$f''(x) = \frac{\cos(x)}{(1 + \sin(x))^2}$$

x-intercepts:  $(\frac{\pi}{2}, 0)$

y-intercepts:  $(0, 1)$

Vertical asymptotes:  $x = \frac{-\pi}{2}$ ,  $x = \frac{3\pi}{2}$

Horizontal asymptotes: none

Critical values: none

Points of Inflection:  $x = \frac{\pi}{2}$

Domain: all real numbers except  $x = \frac{3 + 4n\pi}{2}$

