

4.12 More Curve Sketching

Do **MOAR** of these:

Examples/Homework

$$y = 3x^5 - 10x^3 + 45x, \quad y' = 15x^4 - 30x^2 + 45, \quad y'' = 60x^3 - 60x$$

$$y = x/(x^2 - 1)$$

$$y = (1 - x^2)/(1 + x^2)$$

$$y = 1/(x^3 - x)$$

$$y = x/\sqrt{(x^2 - 1)}$$

$$f(x) = \frac{x^3 - 2}{x}, \quad f'(x) = \frac{2(x^3 + 1)}{x^2}, \quad f''(x) = \frac{2(x^3 - 2)}{x^3}$$

$$f(x) = x \ln x, \quad f'(x) = \ln x + 1, \quad f''(x) = \frac{1}{x}$$

$$f(x) = \frac{3x}{x^2 - x + 1}, \quad f'(x) = -\frac{3(x^2 - 1)}{(x^2 - x + 1)^2}, \quad f''(x) = \frac{6(x^3 - 3x + 1)}{(x^2 - x + 1)^3}$$

$$f(x) = xe^{1-x}, \quad f'(x) = -(x - 1)e^{1-x}, \quad f''(x) = (x - 2)e^{1-x}$$

$$f(x) = x^{\frac{1}{3}}(x - 4)^{\frac{2}{3}}, \quad f'(x) = \frac{3x - 4}{3\sqrt[3]{x - 4}x^{\frac{2}{3}}}, \quad f''(x) = -\frac{32}{9(x - 4)^{\frac{4}{3}}x^{\frac{5}{3}}}$$

$$f(x) = \frac{x^3}{x^2 - 1} \quad f'(x) = \frac{x^2(x^2 - 3)}{(x^2 - 1)^2} \quad f''(x) = \frac{2x(x^2 + 3)}{(x^2 - 1)^3}$$

$$f(x) = \ln(x^2 - 1) \quad f'(x) = \frac{2x}{x^2 - 1} \quad f''(x) = \frac{-2x^2 - 2}{(x^2 - 1)^2}$$

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

$$f(x) = x + \ln x \quad f'(x) = 1 + \frac{1}{x} \quad f''(x) = -\frac{1}{x^2}$$