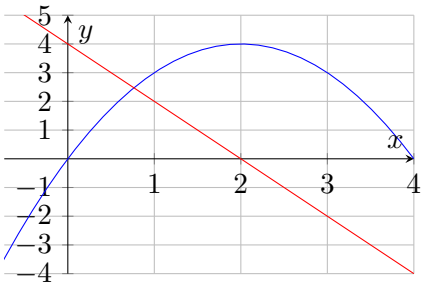
Mini-math Div 3/4: Monday, October 19, 2020 (10 minutes)

(1) Sketch the derivative of the following function on the same graph. Be sure to indicate, if any, approximate zeros, asymptotes, and general shape of the graph of the derivative.

Solution:



(2) Find y' if $y = (x^2 - 6)^{12}$

Solution: $y' = 12(x^2 - 6)^{11} \cdot 2x = 24x(x^2 - 6)^{11}$

(3) Find $\dfrac{dA}{dt}$ if $A = \pi r^2$ and $\dfrac{dr}{dt} = 3$.

Solution: $\dfrac{dA}{dt} = \dfrac{dA}{dr} \cdot \dfrac{dr}{dt} = 2\pi r \cdot 3 = 6\pi r$

(4) Find the rate of change of f with respect to t if $f(t) = \sqrt{\dfrac{t+1}{t-1}}$

Solution:

$$\frac{df}{dt} = \frac{1}{2}\left(\frac{t+1}{t-1}\right)^{-1/2} \cdot \frac{(t-1)-(t+1)}{(t-1)^2} = -\frac{1}{(t+1)^{1/2}(t-1)^{3/2}}$$

or viewing $f(t) = \dfrac{(t+1)^{1/2}}{(t-1)^{1/2}}$,

$$\frac{df}{dt} = \frac{\frac{1}{2\sqrt{t+1}} \cdot \sqrt{t-1} - \frac{1}{2\sqrt{t-1}} \cdot \sqrt{t+1}}{t-1} = \frac{(t-1)-(t+1)}{2(t-1)\sqrt{t-1}\sqrt{t+1}} = -\frac{1}{(t+1)^{1/2}(t-1)^{3/2}}$$