

1. For the function $f(x) = 1/x$ compute the derivative function from the definition using limits.

$$\begin{aligned} f'(x) &= \lim_{h \rightarrow 0} \frac{\frac{1}{x+h} - \frac{1}{x}}{h} = \lim_{h \rightarrow 0} \frac{\frac{x - (x+h)}{x(x+h)}}{h} \\ &= \lim_{h \rightarrow 0} \frac{-h}{h x(x+h)} \\ &= \lim_{h \rightarrow 0} \frac{-1}{x(x+h)} \\ &= -\frac{1}{x^2} \end{aligned}$$

2. Find the equation of the tangent line to the curve $y = 1/x$ at $x = 2$.

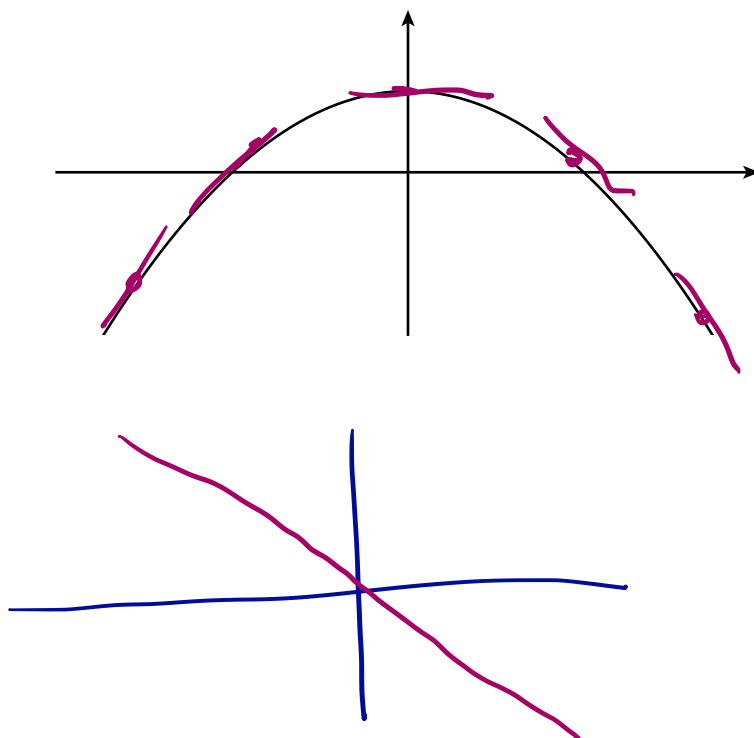
$$\text{If } f(x) = \frac{1}{x}, \quad f'(x) = -\frac{1}{x^2} \quad \text{and} \quad f'(2) = -\frac{1}{4}$$

$$y - \frac{1}{2} = -\frac{1}{4}(x - 2)$$

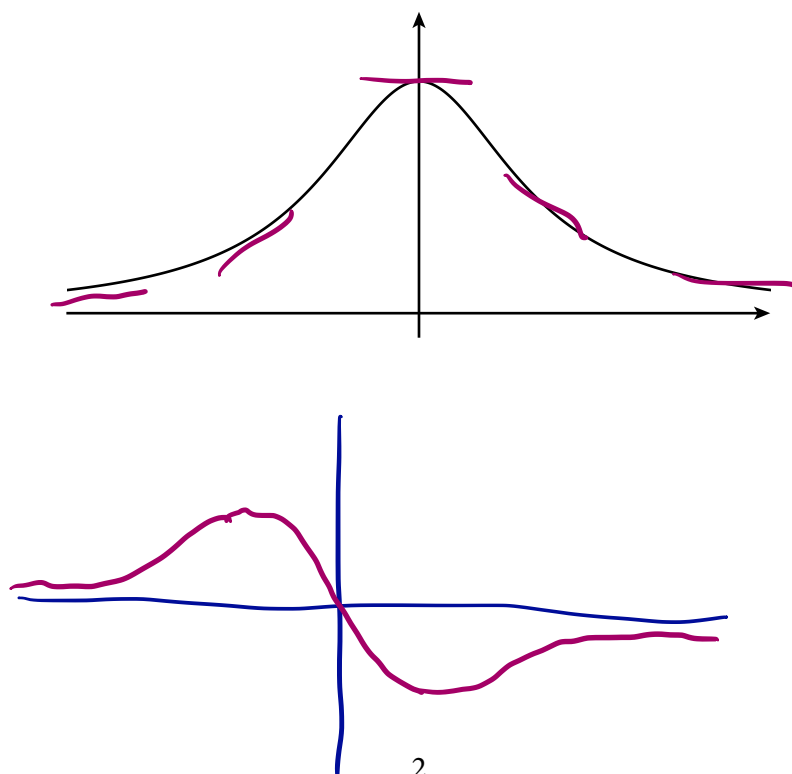
$$y = \frac{1}{2} - \frac{1}{4}(x - 2)$$

For each of the remaining problems I have sketched for you the graph of $f(x)$. Your job: sketch $f'(x)$.

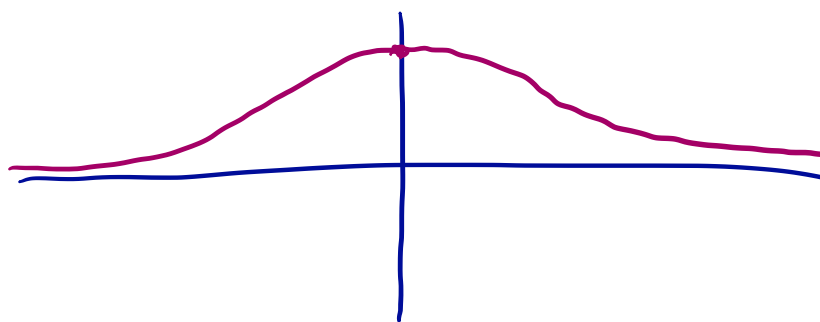
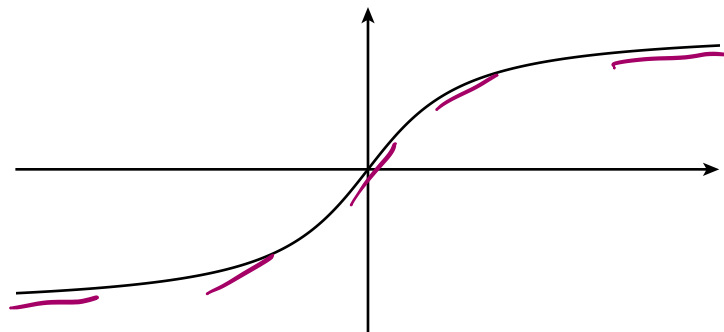
3.



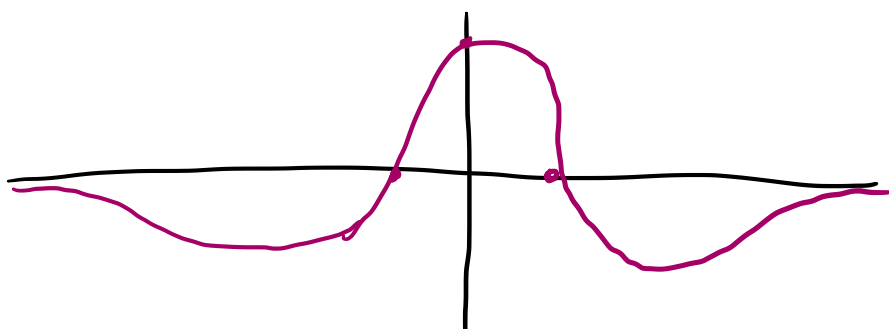
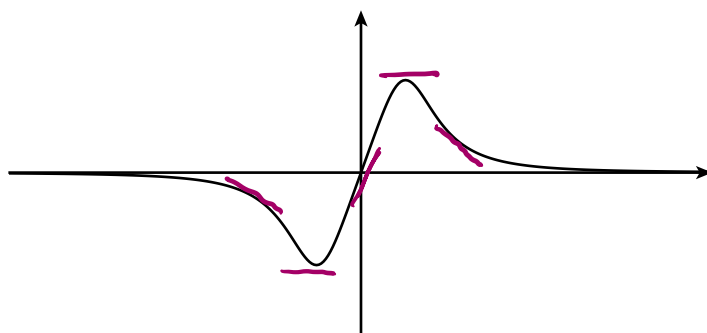
4.



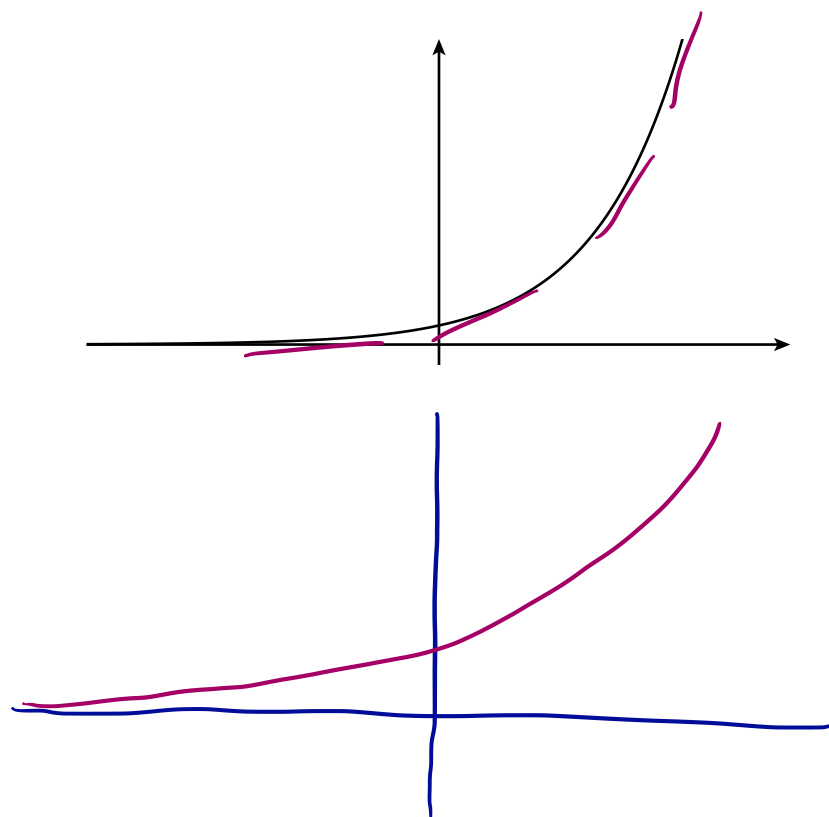
5.



6.



7.



8.

