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

$$f'(a) = \lim_{h\to 0} \frac{\frac{1}{a+h} - \frac{1}{a}}{h} = \lim_{h\to 0} \frac{\frac{a-(a+h)}{a(a+h)}}{h}$$

$$= \lim_{h\to 0} \frac{-h}{h\,a\,(a+h)}$$

$$= \lim_{h\to 0} \frac{-1}{a(a+h)}$$

$$= \frac{-1}{a(a+0)} = \boxed{\frac{-1}{a^2}}$$

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

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

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

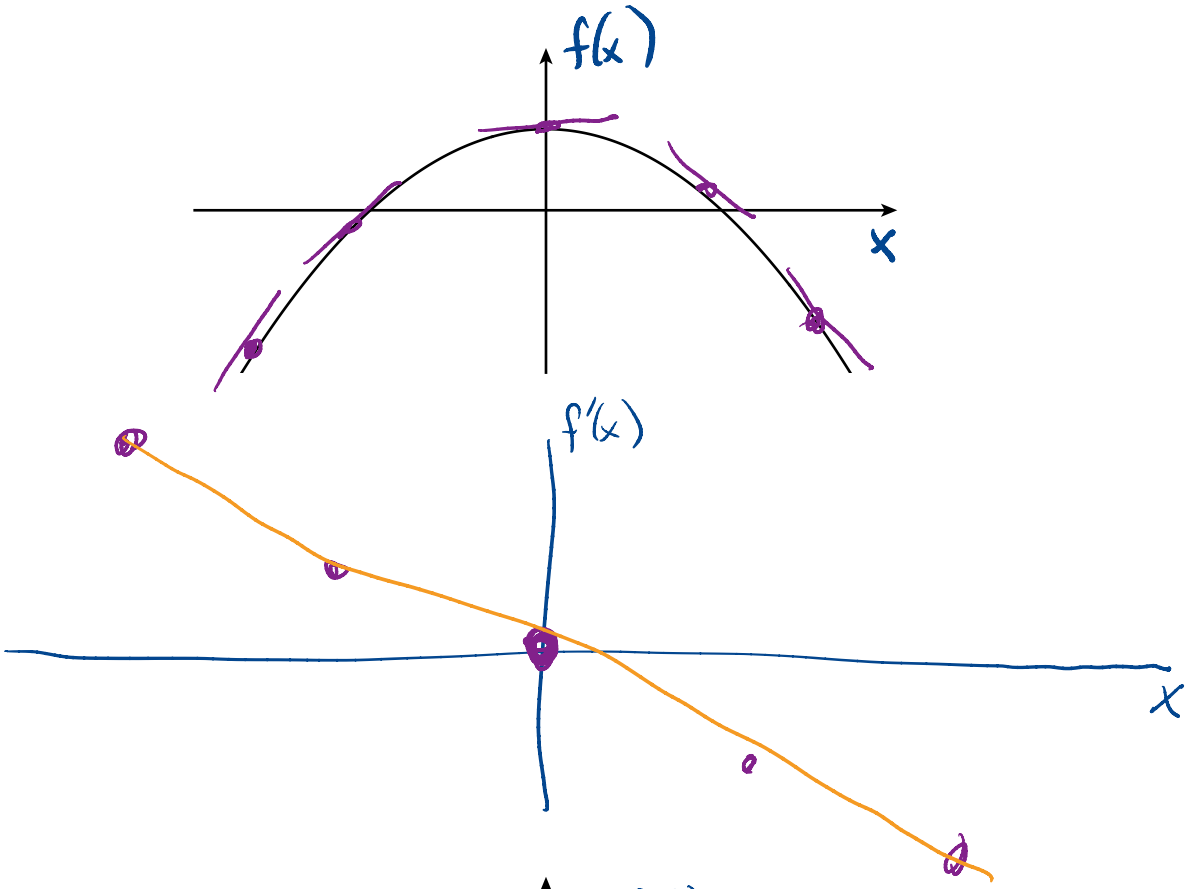
$$y(2) = \frac{1}{2}$$

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

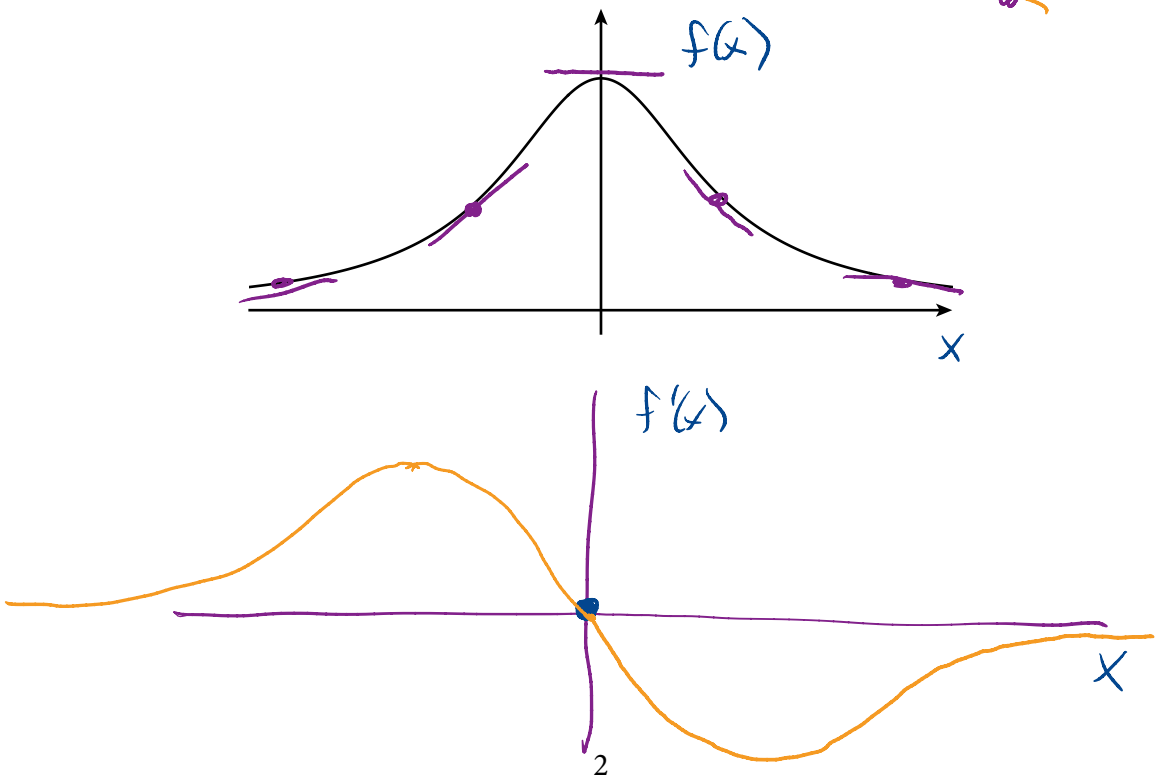
$$\boxed{y = \frac{1}{2} - \frac{1}{4}(x-2)}$$

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

3.



4.



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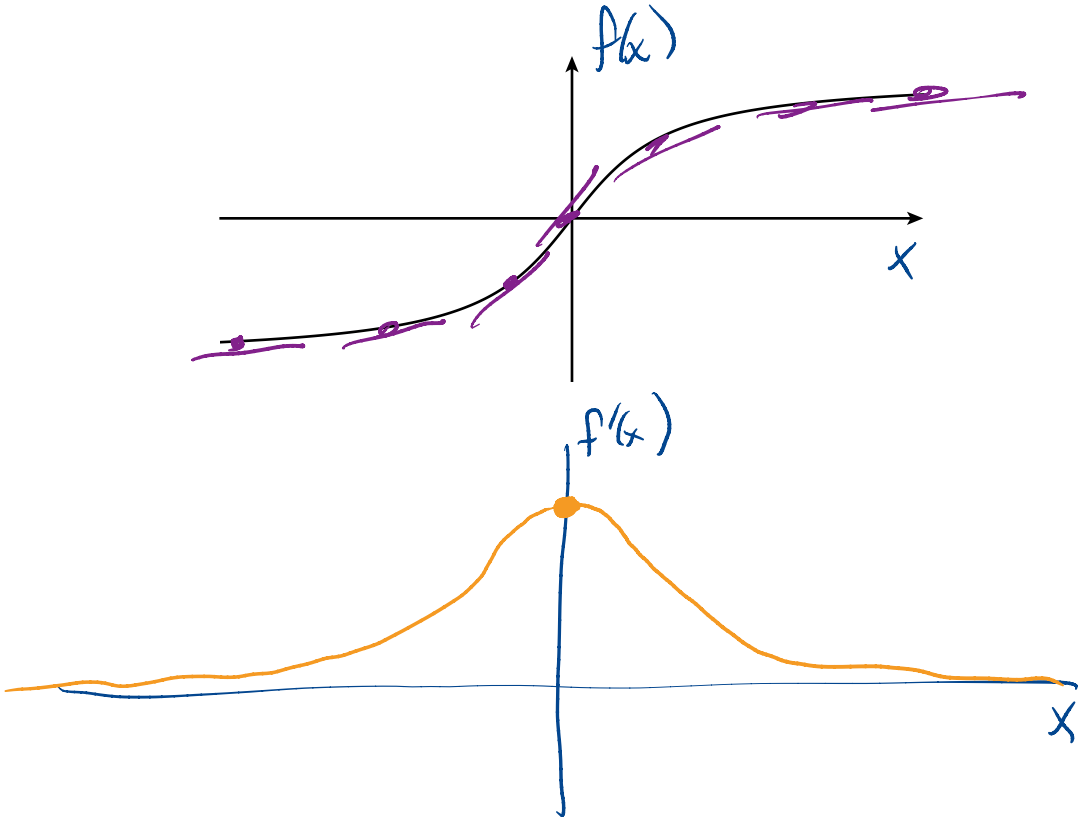

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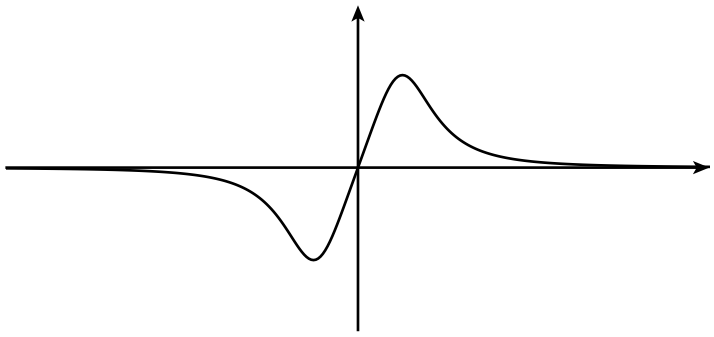

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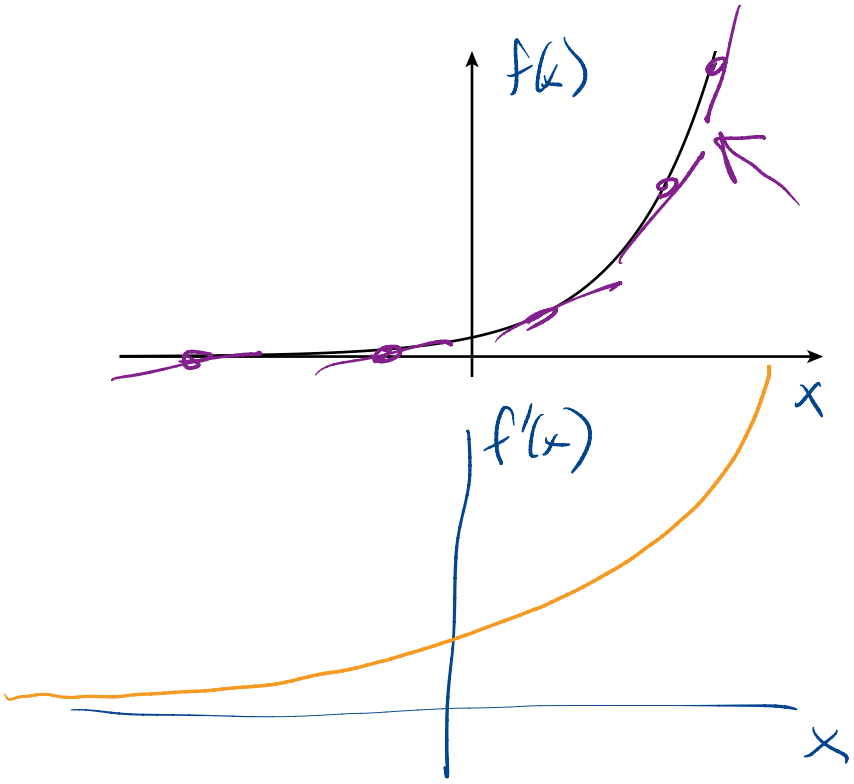

8.