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

$$f'(x) = \lim_{b \to x} \frac{f(b) - f(x)}{b - x}$$

$$= \lim_{b \to x} \frac{\frac{1}{b} - \frac{1}{x}}{b - x}$$

$$= \lim_{b \to x} \frac{\frac{x - b}{bx}}{b - x}$$

$$= \lim_{b \to x} \frac{-1}{bx}$$

$$= -\frac{1}{x^2}$$

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

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

$f(2) = \frac{1}{2}$ $\quad f'(2) = -\frac{1}{4}$

Point slope form $y - y_0 = m(x - x_0)$

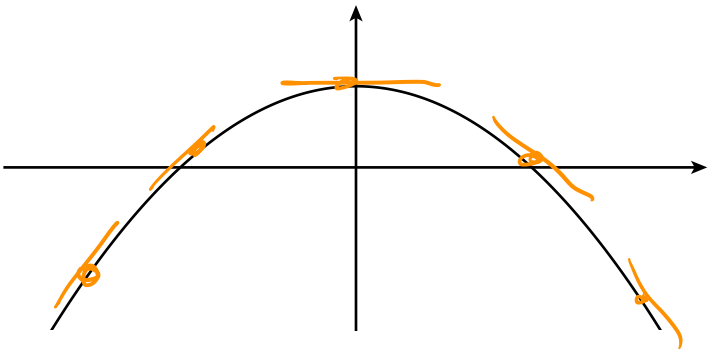
$y_0 = \frac{1}{2}$, $m = -\frac{1}{4}$, $x_0 = 2$

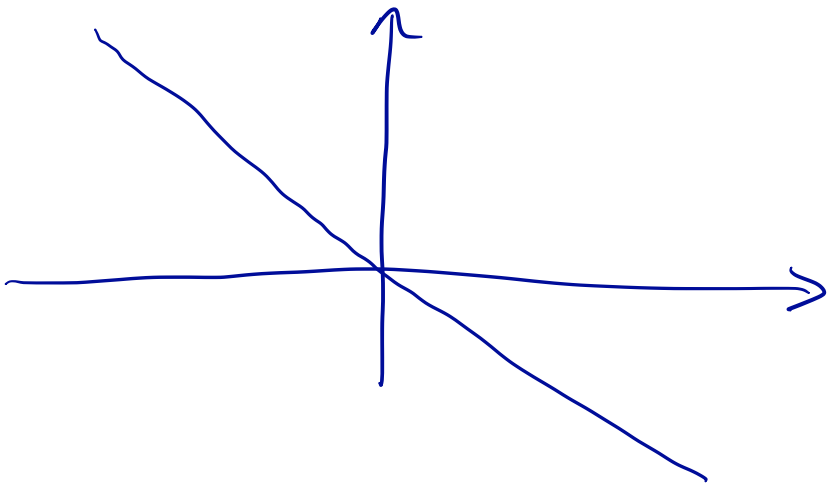
$$\boxed{y - \frac{1}{2} = -\frac{1}{4}(x - 2)}$$

3. Use the derivative approximation at $x = 2$ to estimate $\dfrac{1}{2.1}$.

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

4.





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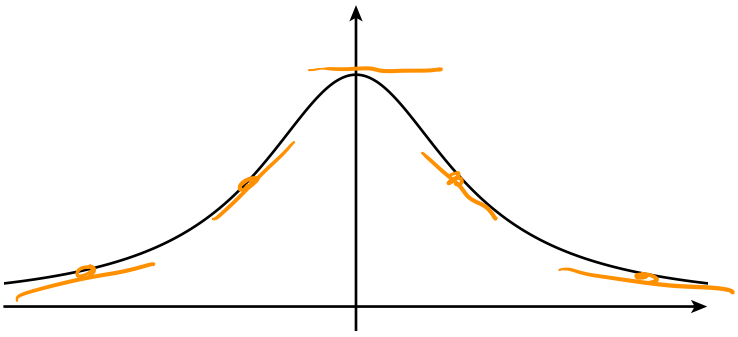

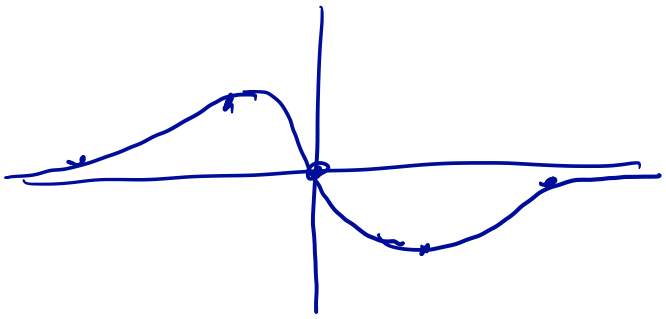

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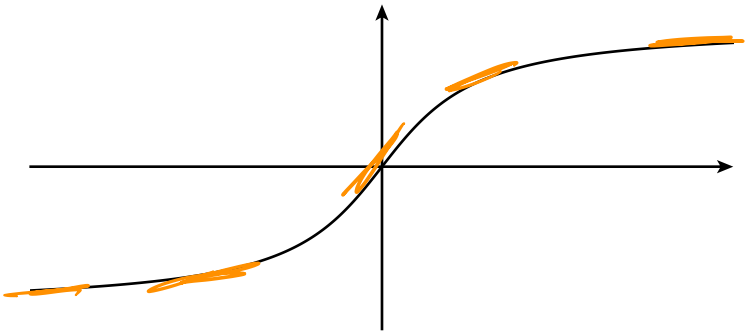

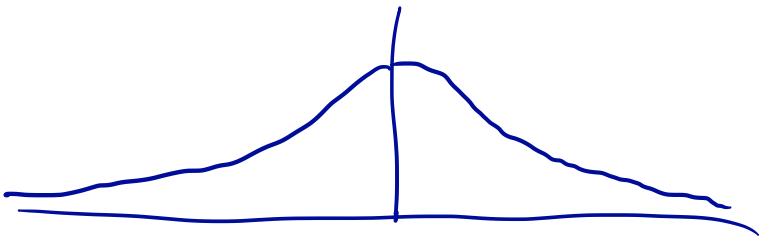

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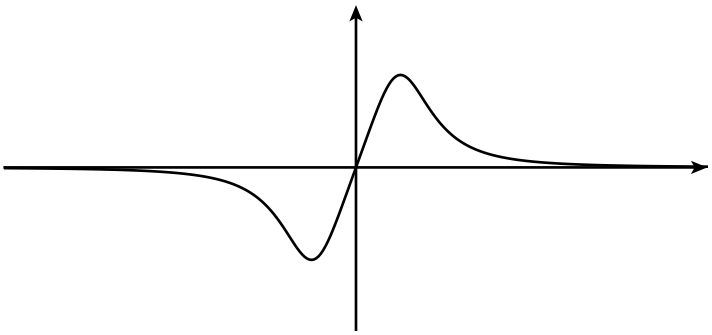

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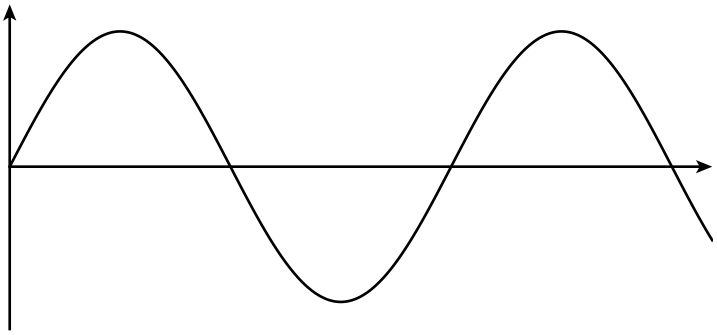

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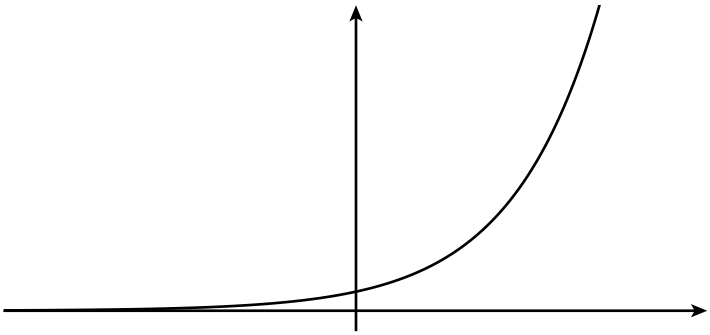

10.