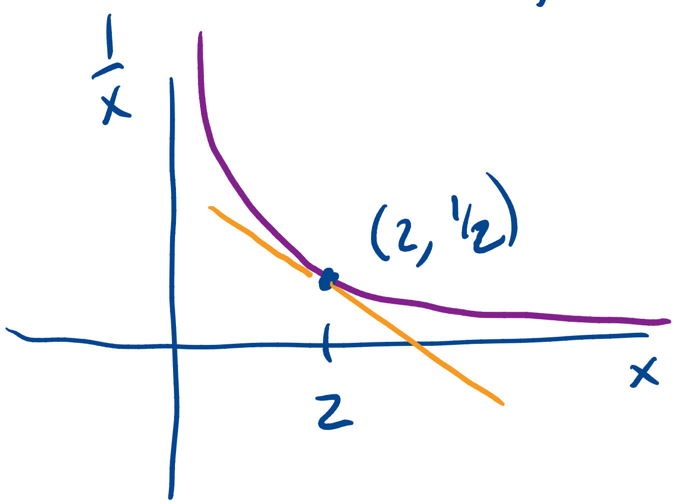
1. We showed that if $f(x) = 1/x$ then $f'(x) = -1/x^2$.

Find the equation of the tangent line to the curve $y = 1/x$ at $x = 2$ and at $x = 4$. Then sketch the graph of $y = 1/x$ and the two tangent lines.

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



point: $(2, 1/2)$

slope: $-1/4$

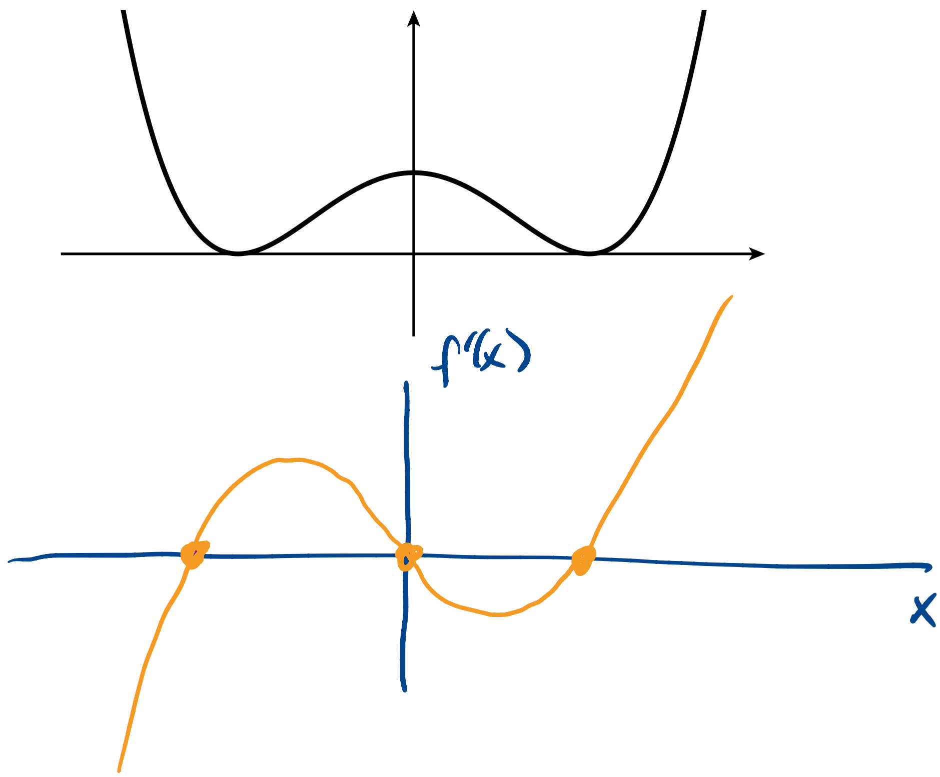
$$y - \frac{1}{2} = -\frac{1}{4}(x-2)$$

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

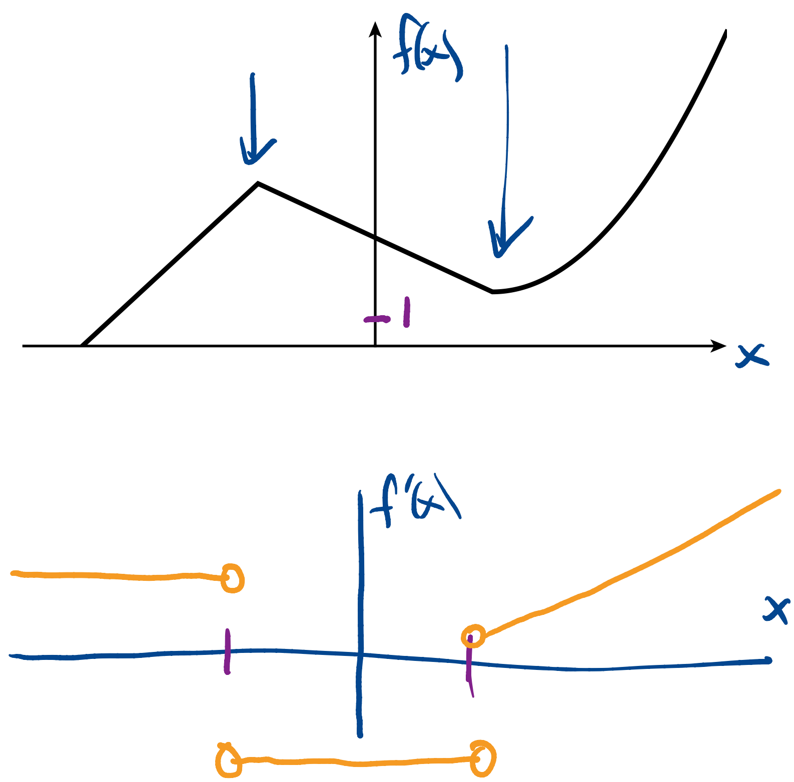
At $x = 4$, $y = \frac{1}{4}$, $f'(4) = \frac{-1}{16}$

$$\boxed{y = \frac{1}{4} - \frac{1}{16}(x-4)}$$

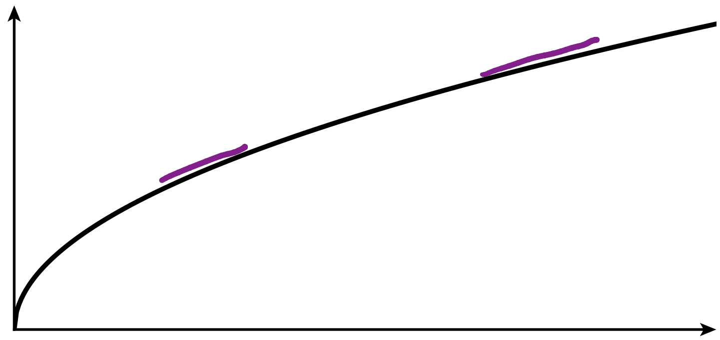
2. Given the graph of $f(x)$ below, sketch $f'(x)$.

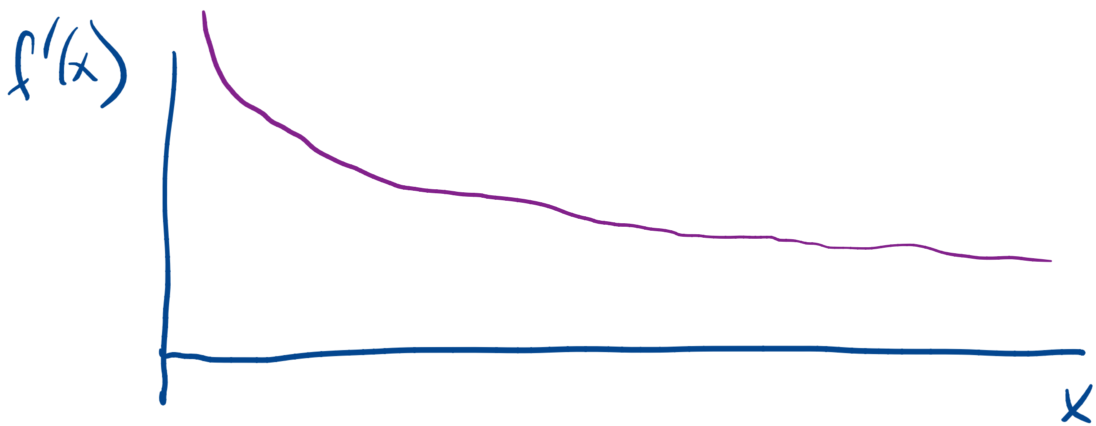


3. Given the graph of $f(x)$ below, sketch $f'(x)$.



4. The graph below is $f(x) = \sqrt{x}$. Sketch $f'(x)$.





5. From the definition of the derivative, compute $f'(x)$ when $f(x) = \sqrt{x}$. Does your result agree with you sketch above?

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

$$= \lim_{h \to 0} \frac{\sqrt{x+h} - \sqrt{x}}{h}$$

$$= \lim_{h \to 0} \frac{\sqrt{x+h} - \sqrt{x}}{h} \cdot \frac{\sqrt{x+h} + \sqrt{x}}{\sqrt{x+h} + \sqrt{x}}$$

$$= \lim_{h \to 0} \frac{x+h-x}{h\left(\sqrt{x+h}+\sqrt{x}\right)}$$

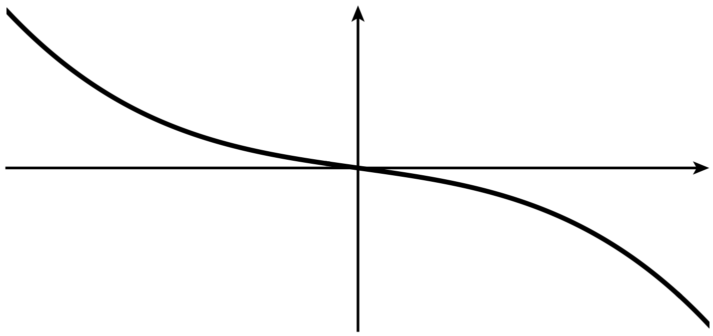
$$= \lim_{h \to 0} \frac{h}{h\left(\sqrt{x+h}+\sqrt{x}\right)}$$

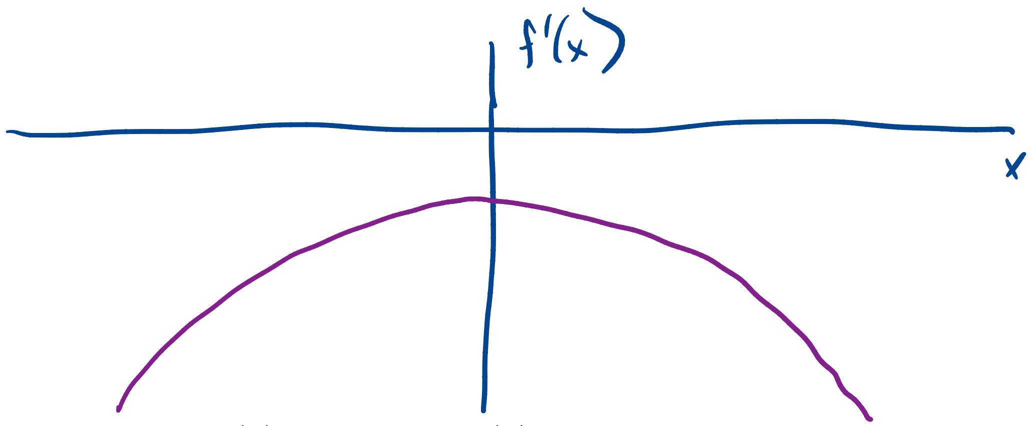
$$= \lim_{h \to 0} \frac{1}{\sqrt{x+h}+\sqrt{x}}$$

$$= \frac{1}{\sqrt{x+0}+\sqrt{x}} = \frac{1}{2\sqrt{x}}$$

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

6. Given the graph of $f(x)$ below, sketch $f'(x)$.





7. Given the graph of $f(x)$ below, sketch $f'(x)$.