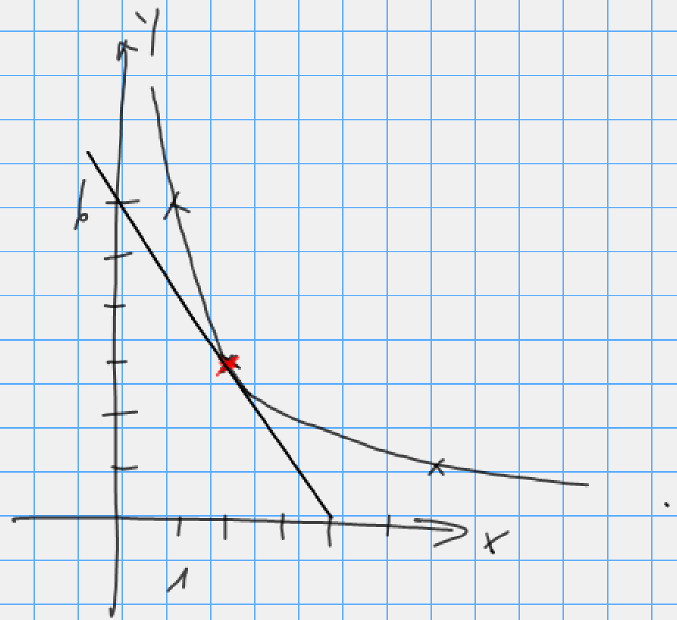
3a $f(x) = -\frac{1}{3}x^2 + 1$

$f'(x) = -\frac{2}{3}x$

$f'(3) = -2$ $y = -2x + 4$ $\varphi = 63{,}4°$

37/5c $\quad f(x)=\frac{6}{x} \quad \mathbb{D}=\mathbb{R}\setminus\{0\}$



$x_0=2$

$$f'(x_0)=\lim_{h\to 0}\frac{f(x_0+h)-f(x_0)}{h}$$

$$=\lim_{h\to 0}\frac{\frac{6}{x_0+h}-\frac{6}{x_0}}{h}$$

$$=\lim_{h\to 0}\frac{\frac{6x_0-6(x_0+h)}{(x_0+h)\cdot x_0}}{h}=\lim_{h\to 0}\frac{\cancel{6x_0}-\cancel{6x_0}-6h}{h\,(x_0+h)\cdot x_0}$$

$$=\lim_{h\to 0}\frac{-6\cancel{h}}{\cancel{h}(x_0+h)\cdot x_0}=\lim_{h\to 0}\frac{-6}{x_0^2+x_0h}=-\frac{6}{x_0^2}$$

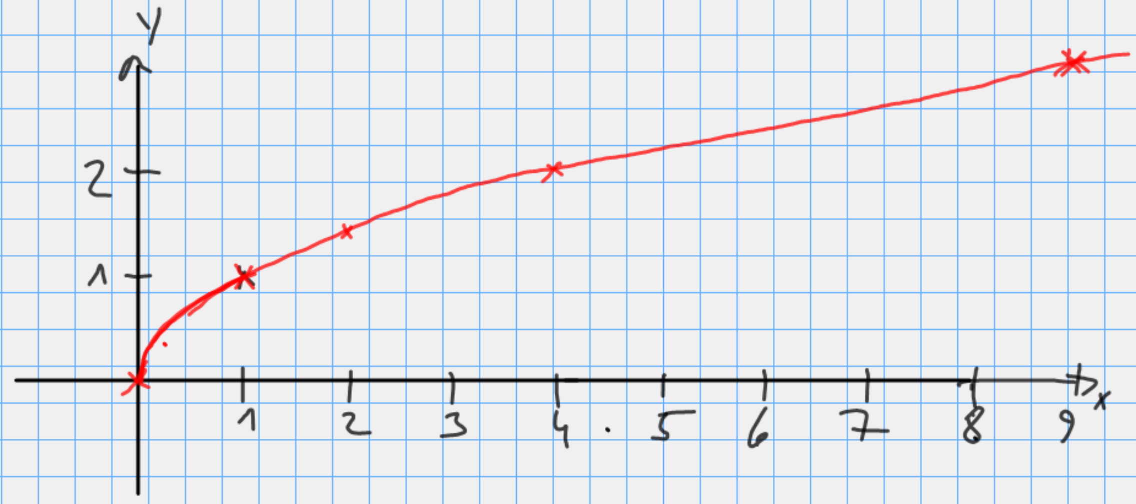
$x_0=2 \Rightarrow f'(2)=-\frac{3}{2}$ $\qquad f(2)=3 \qquad y=mx+t$

$(2;3) \qquad 3=-1{,}5\cdot 2+t$

Gleichung der Tangente: $y=-\frac{3}{2}x+6$

5d) $f(x)=\sqrt{x}$; $\mathbb{D}=\mathbb{R}_0^+$

$x_0=9$



$$f'(x_0)=\lim_{h\to 0}\frac{\sqrt{x_0+h}-\sqrt{x_0}}{h}$$

$$=\lim_{h\to 0}\frac{(\sqrt{x_0+h}-\sqrt{x_0})\cdot(\sqrt{x_0+h}+\sqrt{x_0})}{h\cdot(\sqrt{x_0+h}+\sqrt{x_0})}=\lim_{h\to 0}\frac{\cancel{x_0}+h-\cancel{x_0}}{h(\sqrt{x_0+h}+\sqrt{x_0})}$$

$$=\lim_{h\to 0}\frac{\cancel{h}}{\cancel{h}(\sqrt{x_0+h}+\sqrt{x_0})}=\frac{1}{2\sqrt{x_0}}$$

$f'(9)=\frac{1}{6}$

Gleichung der Tangente $y=\frac{1}{6}x+1{,}5$