IMA1 Dú 4. Roland Schulz xschul06

b)

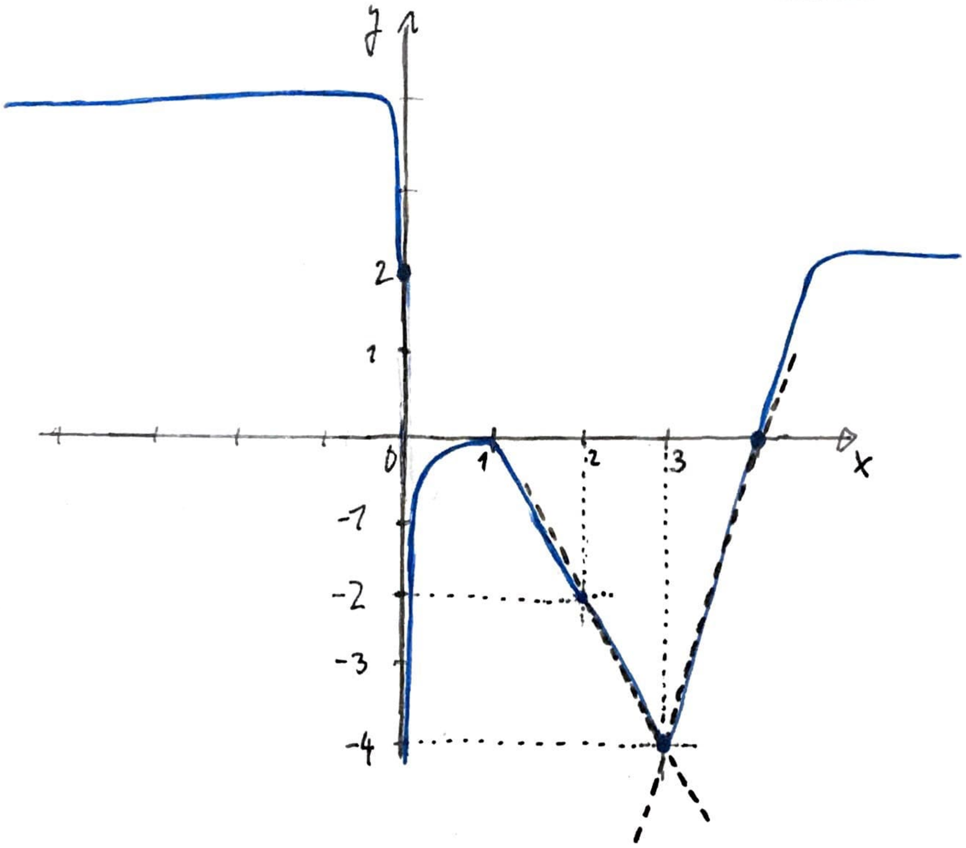
$f(0)=2$

$f'(0)=-\infty$

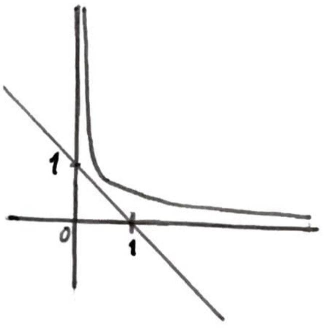
$f(3)=-4$

$f'_-(3)=-2$

$f'_+(3)=4$



a) $f(x)=\operatorname{arctg}\frac{x}{x-1}$; p: $y=-x+1$ $\rightarrow k=-1$



$$y-\underset{?}{f(x_0)}=\underset{\overset{\shortparallel}{-1}}{\overset{f'(x_0)}{k}}\cdot(x-\underset{?}{x_0})$$

$$f'(x)=\frac{1}{1+\left(\frac{x}{x-1}\right)^2}\cdot\left(\frac{x}{x-1}\right)'=\frac{1}{1+\left(\frac{x}{x-1}\right)^2}\cdot\frac{1\cdot(x-1)-x\cdot(1+0)}{(x-1)^2}=\frac{1}{1+\frac{x^2}{(x-1)^2}}\cdot\frac{-1}{(x-1)^2}=\frac{1}{\frac{2x^2-2x+1}{(x-1)^2}}\cdot\frac{-1}{(x-1)^2}=$$

$$=\frac{(x-1)^2}{2x^2-2x+1}\cdot\frac{-1}{(x-1)^2}=\underline{\underline{-\frac{1}{2x^2-2x+1}}}\overset{?}{=}-1\iff x\neq 1\wedge 2x^2-2x+1=1$$

$2x^2-2x+1=1$ pro $x\in\{0,1\}$ $\Rightarrow x_0=0$

$\boxed{x_0=0}$

$y-f(0)=-1\cdot(x-0)$

t: $\underline{y=-x+f(0)}$ $\rightarrow f(0)=\operatorname{arctg}\frac{0}{-1}=\operatorname{arctg}0=0$

$x\in\mathbb{R}\setminus\{1\}$