§ 23 Nr. 2

$f(x) = -3x^2$ ges $f'(x_0)$

$$m_{x_0}(h) = \frac{-3\cdot(x_0+h)^2 - \{-3\cdot x_0^2\}}{h} = \frac{-3\cdot(x_0^2+2x_0h+h^2)+3x_0^2}{h}$$

$$m_{x_0}(h) = \frac{-3x_0^2 - 6x_0h - 3h^2 + 3x_0^2}{h} = \frac{-6x_0h - 3h^2}{h}$$

$$m_{x_0}(h) = \frac{h\cdot(-6x_0 - 3h)}{h} = -6x_0 - 3h$$

$$\lim_{h\to 0} m_{x_0}(h) = \lim_{h\to 0}(-6x_0 - 3h) = \underline{\underline{-6x_0 = f'(x_0)}}$$

x_0 kann nun frei gewählt werden

$\Rightarrow$ für $x_0 = 5 \Rightarrow \underline{\underline{f'(5) = -6\cdot 5 = -30}}$

für $x_0 = -5 \Rightarrow \underline{\underline{f'(-5) = -6\cdot(-5) = 30}}$

für $x_0 = -1{,}5 \Rightarrow \underline{\underline{f'(-1{,}5) = -6\cdot(-1{,}5) = 9}}$