

Blatt 2

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5

$$\begin{aligned} \lim_{h \rightarrow 0} \frac{f(x_0 + hr) - f(x_0)}{h} &= \\ \lim_{h \rightarrow 0} \frac{4 \cos\left(\frac{\pi}{4} + h\sqrt{14}\right) \arctan\left((1+h)e^{-(0+h)^2}\right) - 4 \cos\left(\frac{\pi}{4}\right) \arctan\left(1e^{-0^2}\right)}{h} &= \\ \lim_{h \rightarrow 0} \frac{4 \cos\left(\frac{\pi}{4} + h\sqrt{14}\right) \arctan\left((1+h)e^{-h^2}\right) - 4 \frac{1}{\sqrt{2}} \frac{\pi}{4}}{h} &\text{ Regel von de l'Hospital} \\ \lim_{h \rightarrow 0} \frac{-4 \sin\left(\frac{\pi}{4} + h\sqrt{14}\right) \sqrt{14} \arctan\left((1+h)e^{-h^2}\right) + 4 \cos\left(\frac{\pi}{4} + h\sqrt{14}\right) \frac{e^{h^2}(1-2h-2h^2)}{e^{2h^2} + (1+h)^2}}{1} &= \\ -4 \frac{1}{\sqrt{2}} \sqrt{14} \frac{\pi}{4} + 4 \frac{1}{\sqrt{2}} \frac{1}{2} &= -\sqrt{7}\pi + \sqrt{2} \end{aligned}$$