S 124 Nr 4

a) $f(x) = \sin(x)$; $x \in [0, 2\pi]$

Extrema notw Bed. $f'(x) = \cos(x) = 0$

$\cos\left(\frac{\pi}{2}\right) = \cos\left(\frac{3}{2}\pi\right) = 0$

$H\left(\frac{\pi}{2} \mid 1\right)$ $T\left(\frac{3}{2}\pi \mid -1\right)$

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b) $f(x) = \sin(x) + \cos(x)$; $x \in [0; 2\pi]$

Extrema: notw Bed

$f'(x) = \cos(x) - \sin(x) = 0 \Rightarrow \cos(x) = \sin(x)$

$\cos\left(\frac{\pi}{4}\right) = \sin\left(\frac{\pi}{4}\right) = \frac{1}{2}\sqrt{2} \Rightarrow f'\left(\frac{\pi}{4}\right) = \cos\left(\frac{\pi}{4}\right) - \sin\left(\frac{\pi}{4}\right) = 0$

$\cos\left(\frac{5}{4}\pi\right) = \sin\left(\frac{5}{4}\pi\right) = -\frac{1}{2}\sqrt{2} \Rightarrow f'\left(\frac{5}{4}\pi\right) = \cos\left(\frac{5}{4}\pi\right) - \sin\left(\frac{5}{4}\pi\right) = 0$

Du kannst diese Gleichungen am Einheitskreis lösen!

hinreichende Bed $f''(x_0) < 0 \Rightarrow H$

$f''(x_0) > 0 \Rightarrow T$

$f''(x) = -\sin(x) - \cos(x)$

$f''\left(\frac{\pi}{4}\right) = -\frac{1}{2}\sqrt{2} - \frac{1}{2}\sqrt{2} < 0 \Rightarrow H\left(\frac{\pi}{4} \mid \frac{1}{2}\sqrt{2} + \frac{1}{2}\sqrt{2} = \sqrt{2}\right)$

$f''\left(\frac{5}{4}\pi\right) = -\sin\left(\frac{5}{4}\pi\right) - \cos\left(\frac{5}{4}\pi\right) = +\frac{1}{2}\sqrt{2} + \frac{1}{2}\sqrt{2} > 0$

$\Rightarrow T\left(\frac{5}{4}\pi \mid -\frac{1}{2}\sqrt{2} - \frac{1}{2}\sqrt{2} = -\sqrt{2}\right)$