S 154 Nr. 10

c) $f(x) = -7 \cdot \sin(0{,}1x)$; $I = [0; 10\pi]$

Nullstellen: $f(x) = 0 \Rightarrow \sin(0{,}1x) = 0 \Rightarrow 0{,}1x = 0 \Rightarrow \underline{x_1 = 0}$

$\vee \quad 0{,}1x = \pi \Rightarrow \underline{x_2 = 10\pi}$

Nullstellen $= \{0; 10\pi\}$

Extremstellen: $f'(x) = 0$ notw. Bed.

$f'(x) = -7 \cdot \cos(0{,}1x) \cdot 0{,}1 = -0{,}7 \cdot \cos(0{,}1x) = 0$

$\Rightarrow \cos(0{,}1x) = 0 \Rightarrow 0{,}1x = \frac{\pi}{2} \Rightarrow x_3 = \frac{\pi}{2 \cdot 0{,}1} = \frac{10\pi}{2} = \underline{5\pi}$

$\vee \quad 0{,}1x = \frac{3}{2}\pi \Rightarrow (x_4) = \frac{3\pi}{2 \cdot 0{,}1} = \frac{3 \cdot 10\pi}{2} = (15\pi) \notin I$

hinr. Bed

$f''(x) = -0{,}7 \cdot (-\sin(0{,}1x)) \cdot 0{,}1 = 0{,}07 \sin(0{,}1x)$

$f''(5\pi) = 0{,}07 \cdot \sin(0{,}1 \cdot 5\pi) = 0{,}07 \cdot \sin\left(\frac{\pi}{2}\right) = 0{,}07 \cdot 1 > 0 \Rightarrow$ Min

Extremstellen $= \{5\pi\}$

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d) $f(x) = 100 \cdot \cos(2(x + \pi))$; $I = [0; 2\pi]$

Nullstellen: $f(x) = 0 \Rightarrow \cos(2 \cdot x + 2\pi) = 0 \Rightarrow 2x + 2\pi = \frac{\pi}{2}$

$\Rightarrow 2x = \frac{\pi}{2} - 2\pi \Rightarrow 2x = -\frac{3}{2}\pi \Rightarrow \left(x = -\frac{3}{4}\pi\right) \notin I$

keine Lösung

$2x + 2\pi = \frac{5}{2}\pi \Rightarrow 2x = \frac{5}{2}\pi - 2\pi = \frac{1}{2}\pi \Rightarrow \underline{x_1 = \frac{\pi}{4}}$

$\vee \quad 2x + 2\pi = \frac{7}{2}\pi \Rightarrow 2x = \frac{7}{2}\pi - 2\pi = \frac{3}{2}\pi \Rightarrow \underline{x_2 = \frac{3}{4}\pi}$

$\vee \quad 2x + 2\pi = \frac{9}{2}\pi \Rightarrow 2x = \left(\frac{9}{2} - 2\right)\pi = \frac{5}{2}\pi \Rightarrow \underline{x_3 = \frac{5}{4}\pi}$

$\vee \quad 2x + 2\pi = \frac{11}{2}\pi = 2x = \left(\frac{11}{2} - 2\right)\pi = \frac{7}{2}\pi \Rightarrow \underline{x_4 = \frac{7}{4}\pi}$

Extrema: notw. Bed. $f'(x) = 100 \cdot (-\sin(2(x + \pi))) \cdot 2 = -200 \cdot \sin(2x + 2\pi)$

$f'(x) = 0 \Rightarrow \sin(2x + 2\pi) = 0 \Rightarrow 2x + 2\pi = 2\pi \Rightarrow \underline{x_5 = \left(\frac{2-2}{2}\right)\pi = 0}$

$\vee \; 2x + 2\pi = 3\pi \Rightarrow \underline{x_6 = \left(\frac{3-2}{2}\right)\pi = \frac{\pi}{2}}$ $\quad \vee \; 2x + 2\pi = 4\pi \Rightarrow \underline{x_7 = \left(\frac{4-2}{2}\right)\pi = \pi}$

$\vee \; 2x + 2\pi = 5\pi \Rightarrow \underline{x_8 = \left(\frac{5-2}{2}\right)\pi = \frac{3}{2}\pi}$ $\quad \vee \; 2x + 2\pi = 6\pi \Rightarrow \underline{x_9 = \left(\frac{6-2}{2}\right)\pi = 2\pi}$

Nullstellen $= \left\{\frac{\pi}{4}; \frac{3}{4}\pi; \frac{5}{4}\pi; \frac{7}{4}\pi\right\}$ Extremstellen $= \left\{0; \frac{\pi}{2}; \pi; \frac{3}{2}\pi; 2\pi\right\}$