S 124 Nr 3

a) $f(x) = \cos(x)$; $P(\frac{7}{4}\pi \mid 2)$ ist Berührpunkt

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

$f'(\frac{7}{4}\pi) = -\sin(\frac{7}{4}\pi) = -(-\frac{1}{2}\sqrt{2}) = \frac{1}{2}\sqrt{2}$

$f(\frac{7}{4}\pi) = \cos(\frac{7}{4}\pi) = \frac{1}{2}\sqrt{2}$

$t(x) = f'(x_0)(x - x_0) + f(x_0)$

$t(x) = \frac{1}{2}\sqrt{2} \cdot (x - \frac{7}{4}\pi) + \frac{1}{2}\sqrt{2}$

$t(x) = \frac{1}{2}\sqrt{2} \cdot x - \frac{1}{2}\sqrt{2} \cdot \frac{7}{4}\pi + \frac{1}{2}\sqrt{2}$

$t(x) = \frac{1}{2}\sqrt{2} \cdot x - \frac{7}{8}\pi \cdot \sqrt{2} + \frac{1}{2}\sqrt{2}$

$\sin(0°) = 0 = \sin(0)$

$\sin(30°) = \frac{1}{2}\sqrt{1} = \sin(\frac{\pi}{6})$

$\sin(45°) = \frac{1}{2}\sqrt{2} = \sin(\frac{\pi}{4})$

$\sin(60°) = \frac{1}{2}\sqrt{3} = \sin(\frac{\pi}{3})$

$\sin(90°) = \frac{1}{2}\sqrt{4} = 1 = \sin(\frac{\pi}{2})$

$\cos(90°) = \frac{1}{2}\sqrt{0} = 0 = \cos(\frac{\pi}{2})$

$\cos(60°) = \frac{1}{2}\sqrt{1} = \frac{1}{2} = \cos(\frac{\pi}{3})$

$\cos(45°) = \frac{1}{2}\sqrt{2} = \cos(\frac{\pi}{4})$

$\cos(30°) = \frac{1}{2}\sqrt{3} = \cos(\frac{\pi}{6})$

$\cos(0°) = \frac{1}{2}\sqrt{4} = 1 = \cos(0)$

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b) $f(x) = 3 \cdot \sin(x)$; $P(\frac{5}{3}\pi \mid ?)$

$f'(x) = 3 \cdot \cos(x)$

$f'(\frac{5}{3}\pi) = 3 \cdot \cos(\frac{5}{3}\pi) = 3 \cdot \frac{1}{2}\sqrt{1} = \frac{3}{2}$

$f(\frac{5}{3}\pi) = 3 \cdot \sin(\frac{5}{3}\pi) = 3 \cdot (-\frac{1}{2}\sqrt{3}) = -\frac{3}{2}\sqrt{3}$

$t(x) = f'(x_0)(x - x_0) + f(x_0)$

$t(x) = \frac{3}{2} \cdot (x - \frac{5}{3}\pi) + (-\frac{3}{2}\sqrt{3}) = \frac{3}{2}x - \frac{5\pi}{2} - \frac{3}{2}\sqrt{3}$

c) $f(x) = x + 2 \cdot \sin(x)$; $P(\frac{\pi}{4} \mid ?)$

$f'(x) = 1 + 2 \cdot \cos(x)$

$f'(\frac{\pi}{4}) = 1 + 2 \cdot \cos(\frac{\pi}{4}) = 1 + 2 \cdot \frac{1}{2}\sqrt{2} = 1 + \sqrt{2}$

$f(\frac{\pi}{4}) = \frac{\pi}{4} + 2 \cdot \sin(\frac{\pi}{4}) = \frac{\pi}{4} + 2 \cdot \frac{1}{2}\sqrt{2} = \frac{\pi}{4} + \sqrt{2}$

$t(x) = f'(x_0) \cdot (x - x_0) + f(x_0)$

$t(x) = (1+\sqrt{2}) \cdot (x - \frac{\pi}{4}) + \frac{\pi}{4} + \sqrt{2} = (1+\sqrt{2}) \cdot x + (1+\sqrt{2}) \cdot (-\frac{\pi}{4}) + \frac{\pi}{4} + \sqrt{2}$

$t(x) = (1+\sqrt{2}) \cdot x - \frac{\pi}{4} - \frac{\sqrt{2} \cdot \pi}{4} + \frac{\pi}{4} + \sqrt{2}$

$t(x) = (1+\sqrt{2}) \cdot x - \frac{\sqrt{2} \cdot \pi}{4} + \sqrt{2}$