Nr. 8)

a) $\int_1^x \left(\frac{1}{4}t - \frac{3}{4}\right)^3 dt = \left[\frac{1}{4}\left(\frac{1}{4}t - \frac{3}{4}\right)^4 \cdot \frac{1}{\frac{1}{4}}\right]_1^x =$

$\left[\left(\frac{1}{4}t - \frac{3}{4}\right)^4\right]_1^x = \left(\frac{1}{4}x - \frac{3}{4}\right)^4 - \left\{\left(\frac{1}{4}\cdot 1 - \frac{3}{4}\right)^4\right\} = \left(\frac{x-3}{4}\right)^4 - \left(\frac{1}{2}\right)^4 = \frac{80}{16}$

$\left(\frac{x-3}{4}\right)^4 = \frac{81}{16} \mid \sqrt[4]{\ } \Rightarrow \frac{x-3}{4} = \pm\frac{3}{2} \mid \cdot 4 \Rightarrow x-3 = \pm 6 \mid +3$

$\Rightarrow x_1 = 9 \quad \vee \quad (x_2 = -3) \quad -3 \notin \mathbb{D} \Rightarrow \underline{x = 9}$

b) $\int_0^x \cos\left(\frac{1}{2}t\right) dt = \left[+\sin\left(\frac{1}{2}t\right) \cdot \frac{1}{\frac{1}{2}}\right]_0^x = \left[2\sin\left(\frac{1}{2}t\right)\right]_0^x =$

$2\cdot\sin\left(\frac{1}{2}x\right) - \{2\cdot \underbrace{\sin\left(\frac{1}{2}\cdot 0\right)}_{=0}\} = 2\cdot\sin\left(\frac{1}{2}x\right) = -2 \mid :(+2)$

$\sin\left(\frac{1}{2}x\right) = -1 \mid \arcsin \Rightarrow \frac{1}{2}x = -\frac{\pi}{2} \mid \quad \Rightarrow (x_1 = -\pi < 0) \notin \mathbb{D}$

Periode: $p = \frac{2\pi}{b} = \frac{2\pi}{\frac{1}{2}} = 4\pi \Rightarrow \underline{x_2 = -\pi + 4\pi = 3\pi}$

$\underline{x_3 = 3\pi + 4\pi = 7\pi}$ oder $\underline{x_n = 4\pi\cdot n - \pi = \pi(4n-1)}$; $n \in \mathbb{N}\setminus\{0\}$

c) $\int_0^x 2e^t dt = \left[2e^t\right]_0^x = 2e^x - \{2\cdot e^0\} = 2e^x - 2 = 4 \mid +2$

$2e^x = 6 \mid :2 \Rightarrow e^x = 3 \mid \ln \Rightarrow \underline{x_1 = \ln(3)}$

d) $\int_1^x \frac{1}{t} dt = \left[\ln(|t|)\right]_1^x = \ln(|x|) - \{\ln(1)\} = \ln(x) - 0 = 2;\ x > 1$

$\Rightarrow \underline{x_1 = e^2}$