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Nr. 4)

a) $\int_3^x t^2\,dt = \left[\frac{t^3}{3}\right]_3^x = \frac{x^3}{3} - \left\{\frac{3^3}{3}\right\} = \frac{x^3}{3} - 9 = 12 \quad | +9$

$\Rightarrow \frac{x^3}{3} = 21 \quad | \cdot 3 \Rightarrow x^3 = 63 \quad | \sqrt[3]{\ } \Rightarrow \underline{\underline{x = \sqrt[3]{63} \approx 3,979}}$

b) $\int_2^x (t-2)\,dt = \left[\frac{t^2}{2} - 2t\right]_2^x = \frac{x^2}{2} - 2x - \left\{\frac{2^2}{2} - 2\cdot 2\right\} = \frac{x^2}{2} - 2x + 2$

$\Rightarrow \frac{x^2}{2} - 2x + 2 = 12 \quad | -12 \Rightarrow \frac{x^2}{2} - 2x - 10 = 0$

$\Rightarrow x_{1,(2)} = \frac{+2 \pm \sqrt{4 - 4\cdot\frac{1}{2}\cdot(-10)}}{\frac{1}{2}\cdot 2} = \frac{2 \pm \sqrt{24}}{1} \Rightarrow$ Da $x > 0$; $\underline{\underline{x = 2 + \sqrt{24}}}$

c) $\int_{-1}^x \left(\frac{2}{3}t + \frac{8}{3}\right)dt = \left[\frac{2}{3}\cdot\frac{t^2}{2} + \frac{8}{3}t\right]_{-1}^x = \frac{x^2}{3} + \frac{8}{3}x - \left\{\frac{1}{3} - \frac{8}{3}\right\}$

$\frac{x^2}{3} + \frac{8}{3}x + \frac{7}{3} = 12 \Rightarrow \frac{x^2}{3} + \frac{8}{3}x - \frac{29}{3} = 0$

$x_{1,2} = \frac{-\frac{8}{3} \pm \sqrt{\frac{64}{9} - 4\cdot\frac{1}{3}\cdot\left(-\frac{29}{3}\right)}}{\frac{1}{3}\cdot 2} = \frac{-\frac{8}{3} \pm \sqrt{20}}{\frac{2}{3}} = \left(-\frac{8}{3} \pm 2\sqrt{5}\right)\cdot\frac{3}{2}$

$\underline{\underline{x_1 = -4 + 3\sqrt{5}}}$; $\left(x_2 = -4 - 3\sqrt{5} < 0\right)$

d) $\int_1^x \frac{1}{t}\,dt = \left[\ln(|t|)\right]_1^x = \ln(x) - \ln(1) = \ln(x) = 12$; für $0 < x$

$\ln(x) = 12 \quad | e^{\uparrow} \Rightarrow \underline{\underline{x = e^{12}}}$

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