LS-Kursstufe S 102

Nr. 4a) $V = \pi \cdot \int_0^4 \left(2^2 - (\sqrt{x})^2\right) dx = \pi \cdot \left[4x - \frac{x^2}{2}\right]_0^4 = \pi \cdot (16 - 8) = \underline{\underline{\pi \cdot 8}}$

4b) $V = \pi \cdot \int_0^1 (x^2)^2 - (x^3)^2 dx = \pi \cdot \int_0^1 (x^4 - x^6) dx$

$= \pi \cdot \left[\frac{x^5}{5} - \frac{x^7}{7}\right]_0^1 = \pi \cdot \left(\frac{1}{5} - \frac{1}{7} - \{0\}\right) = \underline{\underline{\pi \cdot \frac{2}{35}}}$

4c) Integrationsgrenzen $\hat{=}$ Schnittstellen der Funktionen

$1 = -x^2 + 2 \Rightarrow x^2 = 1 \Rightarrow x_1 = -1 \vee x_2 = +1$

$V = \pi \cdot \int_{-1}^{1} (-x^2 + 2)^2 - (1)^2 dx = \pi \cdot \int_{-1}^{1} (x^4 - 4x^2 + 4 - 1) dx$

$V = \pi \cdot \int_{-1}^{1} (x^4 - 4x^2 + 3) dx = \pi \cdot \left[\frac{x^5}{5} - 4 \cdot \frac{x^3}{3} + 3x\right]_{-1}^{1}$

$V = \pi \cdot \left(\frac{1}{5} - \frac{4}{3} + 3 - \{-\frac{1}{5} + \frac{4}{3} - 3\}\right) = \underline{\underline{\pi \cdot \frac{56}{15}}}$

O. Fell