S 116 Nr. 2 a)

$$V_a = \pi \int_0^4 \left(2^2 - (\sqrt{x})^2\right) dx = \pi \int_0^4 (4 - x)\, dx = \pi \left[4x - \frac{x^2}{2}\right]_0^4$$

$$V_a = \pi \left[16 - \frac{16}{2} - \{0\}\right] = \underline{\underline{8 \cdot \pi \approx 25,133}}$$

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b)

$$V_b = \pi \int_0^1 \left((x^2)^2 - (x^3)^2\right) dx = \pi \int_0^1 (x^4 - x^6)\, dx = \pi \left[\frac{x^5}{5} - \frac{x^7}{7}\right]_0^1$$

$$V_b = \pi \cdot \left[\frac{1}{5} - \frac{1}{7} - \{0\}\right] = \underline{\underline{\pi \cdot \frac{2}{35} \approx 0,180}}$$

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c) Integrationsgrenzen $\hat{=}$ Schnittstellen der Graphen

$$f(x) = g(x) \Rightarrow -x^2 + 2 = 1 \Rightarrow x^2 = 1 \Rightarrow x_{s_1} = -1 \vee x_{s_2} = +1$$

$$V_c = \pi \cdot \int_{-1}^{1} (-x^2 + 2)^2\, dx - \pi \int_{-1}^{1} 1^2\, dx = \pi \int_{-1}^{1} \left((-x^2 + 2)^2 - 1^2\right) dx$$

$$V_c = \pi \int_{-1}^{1} (x^4 - 4x^2 + 4 - 1)\, dx = \pi \int_{-1}^{1} (x^4 - 4x^2 + 3)\, dx$$

$$V_c = \pi \left[\frac{x^5}{5} - \frac{4x^3}{3} + 3x\right]_{-1}^{1} = \pi \cdot \left[\frac{1}{5} - \frac{4}{3} + 3 - \left\{-\frac{1}{5} + \frac{4}{3} - 3\right\}\right]$$

$$V_c = \left[\frac{2}{5} - \frac{8}{3} + 6\right] \cdot \pi = \left[\frac{6}{15} - \frac{40}{15} + 6\right] \cdot \pi = \underline{\underline{\frac{56}{15} \cdot \pi \approx 11,729}}$$