S 117 Nr. 3

a) $V_a = \pi \cdot \int_1^3 \left(2 \cdot e^{-0,4x}\right)^2 dx = \pi \cdot \int_1^3 \left(4 \cdot e^{-0,4 \cdot 2 \cdot x}\right) dx = \pi \int_1^3 \left(4 \cdot e^{-0,8x}\right) dx$

$V_a = \pi \cdot 4 \cdot \int_1^3 e^{-0,8x} dx = 4 \cdot \pi \cdot \left[e^{-0,8x} \cdot \frac{1}{-0,8} \right]_1^3 = 4\pi \cdot \left[-\frac{5}{4} \cdot e^{-0,8x} \right]_1^3$

$V_a = 4\pi \cdot \left[-\frac{5}{4} \cdot e^{-2,4} - \left\{ -\frac{5}{4} \cdot e^{-0,8} \right\} \right] = \underline{\underline{5\pi \cdot \left[-e^{-2,4} + e^{-0,8} \right]}}$

$V_a \approx 5 \cdot \pi \cdot 0,359 \approx \underline{\underline{5,633}}$

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b) $V_b = \pi \cdot \int_0^{\pi} \left(\sin(x)\right)^2 dx \approx \pi \cdot \left[1,571 \right] \approx \underline{\underline{4,935}}$ Mit GTR

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c) $V_c = \pi \cdot \int_2^5 \left(\frac{1}{(x-1)^2} \right)^2 dx = \pi \int_2^5 \frac{1}{(x-1)^4} dx = \pi \left[\frac{1}{(x-1)^3 \cdot (-3)} \right]_2^5$

$V_c = \pi \cdot \left[\frac{1}{-3 \cdot (5-1)^3} - \left\{ \frac{1}{-3(2-1)^3} \right\} \right] = \pi \left[-\frac{1}{192} + \frac{1}{3} \right] = \underline{\frac{21}{64} \cdot \pi}$

$\underline{\underline{\approx 1,031}}$