

S 117 Nr. 5

a)  $f(x) > g(x)$  für  $3 < x < 8$

$$V_a = \pi \int_3^8 (\sqrt{x+1})^2 dx - \pi \int_3^8 1^2 dx = \pi \int_3^8 (x+1-1) dx = \pi \left[ \frac{x^2}{2} \right]_3^8$$

$$V_a = \pi \cdot \left[ \frac{64}{2} - \left\{ \frac{9}{2} \right\} \right] = \underline{\underline{\frac{55}{2} \cdot \pi}} \approx \underline{\underline{86,394}}$$

b)  $g(x) \geq f(x)$  für  $-1 \leq x \leq 1$

$$V_A = \pi \cdot \int_{-1}^1 (g(x)^2 - f(x)^2) dx = \pi \int_{-1}^1 ((-x^2+3)^2 - (x^2+1)^2) dx$$

$$V_A = \pi \int_{-1}^1 (x^4 - 6x^2 + 9 - (x^4 + 2x^2 + 1)) dx = \pi \int_{-1}^1 (-8x^2 + 8) dx$$

$$V_A = \pi \left[ -\frac{8x^3}{3} + 8x \right]_{-1}^1 = \pi \left[ -\frac{8}{3} + 8 - \left\{ \frac{8}{3} - 8 \right\} \right] = \pi \underline{\underline{\frac{32}{3}}} \approx \underline{\underline{33,51}}$$

6.)  $V = \pi \cdot \int_0^5 2^2 dx - \pi \int_0^5 1,5^2 dx = \pi \int_0^5 (2^2 - 1,5^2) dx = \pi \cdot \int_0^5 (4 - 2,25) dx$

$$V = \pi \left[ 1,75x \right]_0^5 = \pi \cdot 1,75 \cdot 5 \approx 27,489$$

Beschreibt das Volumen eines Hohlzylinders mit dem äußeren Radius 2 und dem inneren Radius 1,5 und der Höhe 5

$$V = \pi \int_0^5 f(x)^2 - g(x)^2 dx \neq \pi \int_0^5 (f(x) - g(x))^2 dx$$
$$\pi \int_0^5 (f(x)^2 - 2f(x) \cdot g(x) + g(x)^2) dx$$