S 109 Nr. 2

b.) Fläche $\underline{I}$ = $A_1 + A_2 + A_3 + A_6$

$f(x) = -x^2 + 2 = 0 \Rightarrow x_{1,2} = \pm\sqrt{2}$

Fläche $\underline{I}$ = $\int_{-\sqrt{2}}^{\sqrt{2}} (-x^2+2)\,dx = \left[-\frac{x^3}{3} + 2x\right]_{-\sqrt{2}}^{\sqrt{2}} = -\frac{2\sqrt{2}}{3} + 2\cdot\sqrt{2}$

$-\left\{+\frac{2\sqrt{2}}{3} - 2\sqrt{2}\right\} = 4\sqrt{2} - \frac{4}{3}\sqrt{2} = \frac{8}{3}\sqrt{2} \approx \underline{\underline{3,771}}$

Fläche $\underline{II}$ = $A_2 + A_3 + A_4 + A_5$

Schnitt f mit g $\Rightarrow -x^2 + 2 = 2x^2 - 1 \Rightarrow 1 = x^2 \Rightarrow x_{1,2} = \pm 1$

Fläche $\underline{II}$ = $\int_{-1}^{+1} f(x) - g(x)\,dx = \int_{-1}^{+1} \left((-x^2+2) - (2x^2-1)\right) dx$

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

$= \underline{\underline{4}}$

Fläche $\underline{III}$ = $A_3 + A_6 = \int_{0}^{\sqrt{2}} (-x^2+2)\,dx = \left[-\frac{x^3}{3} + 2x\right]_{0}^{\sqrt{2}}$

$= -\frac{2\sqrt{2}}{3} + 2\sqrt{2} = \frac{4}{3}\sqrt{2} \approx \underline{\underline{1,886}}$

Fläch $\underline{IV}$ = $A_7 = \int_{-2}^{-\sqrt{2}} |-x^2+2|\,dx = \int_{-2}^{-\sqrt{2}} (x^2-2)\,dx = \left[\frac{x^3}{3} - 2x\right]_{-2}^{-\sqrt{2}}$

$= \frac{-2\sqrt{2}}{3} + 2\sqrt{2} - \left\{-\frac{8}{3} + 4\right\} = \frac{4}{3}\sqrt{2} + \frac{8}{3} - 4 \approx \underline{\underline{0,552}}$