Musteraufgabe

Fach:	*Mathematik*	Themen:	*Entspricht Ü5 A3*
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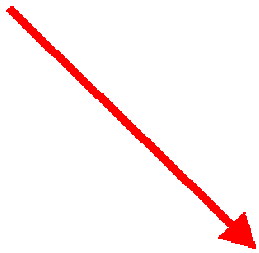
$f(x) = x^2$

$g(x) = -x^2 + k$

Forderung!: A= 1

k = ?

Schnittstellen: f (x) = g (x)



$$x^2 = -x^2 + k$$
$$2x^2 - k = 0$$
$$2x^2 = k$$
$$x^2 = \frac{k}{2}$$
$$x = \pm\sqrt{\frac{k}{2}}$$

A=

$$1.0 = 2 \cdot \left| \int_0^{\sqrt{\frac{k}{2}}} (f(x) - g(x))\,dx \right|$$

$$1.0 = 2 \cdot \left| \int_0^{\sqrt{\frac{k}{2}}} (2x^2 - k)\,dx \right|$$

$$1.0 = 2 \cdot \left| \left[\frac{2x^3}{3} - kx \right]_0^{\sqrt{\frac{k}{2}}} \right|$$

$$1.0 = 2 \cdot \left| \frac{k \cdot \sqrt{\frac{k}{2}}}{3} - k \cdot \sqrt{\frac{k}{2}} \right|$$

(Grenzen einsetzen; beachte $\left(\sqrt{\frac{k}{2}}\right)^3 = \frac{k}{2}\sqrt{\frac{k}{2}}$)

$$0.5 = \left| \frac{k \cdot \sqrt{\frac{k}{2}}}{3} - k \cdot \sqrt{\frac{k}{2}} \right|$$

$$1.5 = \left| k \cdot \sqrt{\frac{k}{2}} - 3k \cdot \sqrt{\frac{k}{2}} \right|$$

$$1.5 = \left| \left(k \cdot \sqrt{\frac{k}{2}} \right) \cdot (1-3) \right|$$

$$1.5 = \left| \left(k \cdot \sqrt{\frac{k}{2}} \right) \cdot (-2) \right|$$ (Betrag kann entfallen, da k >0)

$$0.75 = k \cdot \sqrt{\frac{k}{2}}$$

$$\frac{0.75}{k} = \sqrt{\frac{k}{2}} \quad | \ ()^2$$

$$\frac{9/16}{k^2} = \frac{k}{2}$$

$$\frac{9}{16} = \frac{k^3}{2}$$

$$1\frac{1}{8} = k^3$$

$$k = \sqrt[3]{1\frac{1}{8}} = \frac{\sqrt[3]{9}}{2}$$

$$k = 1.04$$

Probe und Vergleich:

a) **k=1**

$$\int_{-\sqrt{\frac{1}{2}}}^{\sqrt{\frac{1}{2}}} (-2x^2 + 1)\,dx = 0{,}94$$

- v(1/2)

b) **k=2**

$$\int_{-\sqrt{1}}^{\sqrt{1}} (-2x^2 + 2)\,dx = 2{,}66$$

c) **k= 1,04**

$$\int_{-\sqrt{\frac{1{,}04}{2}}}^{\sqrt{\frac{1{,}04}{2}}} (-2x^2 + 1{,}04)\,dx \approx 1$$

wie es gefordert ist.