S 110 Nr. 8

$$f_t(x) = \frac{t}{x^2} \quad ; \quad t > 0$$

$$A(t) = \int_1^2 \frac{t}{x^2}\,dx = \left[-\frac{t}{x}\right]_1^2 = -\frac{t}{2} - \left\{-\frac{t}{1}\right\} = -\frac{t}{2} + t = \frac{t}{2}$$

$$A(t) = \frac{t}{2} = 8 \Rightarrow \underline{\underline{t = 16}}$$

S 110 Nr. 9

$$f_t(x) = x^2 - t^2 = (x-t)(x+t) = 0 \Rightarrow x_1 = -t \;\vee\; x_2 = +t$$

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

$$A(t) = \left|-\frac{2}{3}t^3 - \frac{2}{3}t^3\right| = \frac{4}{3}t^3 = 36 \Rightarrow t^3 = \frac{36}{4} \cdot 3 = 27$$

$$\underline{\underline{t = \sqrt[3]{27} = 3}}$$

S 110 Nr. 10 Für $a \geq 0$

$$A(a) = \int_0^{\pi} a \cdot \sin(x) - \left(-\frac{1}{a} \cdot \sin(x)\right) dx = \left[-a \cdot \cos(x) - \frac{1}{a}\cos(x)\right]_0^{\pi}$$

$$A(a) = -a \cdot \cos(\pi) - \frac{1}{a}\cos(\pi) - \left\{-a \cdot \cos(0) - \frac{1}{a}\cos(0)\right\}$$

$$A(a) = a + \frac{1}{a} + a + \frac{1}{a} = 2a + \frac{2}{a} \quad ; \quad A'(a) = 2 - \frac{2}{a^2}$$

Notwendige Bed. für Minimum $A'(a) = 0$

$$2 - \frac{2}{a^2} = 0 \Rightarrow 2a^2 - 2 = 0 \Rightarrow a^2 = 1 \Rightarrow a_{1,2} = \pm 1$$

hinr. Bed. $A''(a) = +\frac{4}{a^3} > 0 \Rightarrow a = +1$

Für $a = 1$ ist der Flächeninhalt minimal.