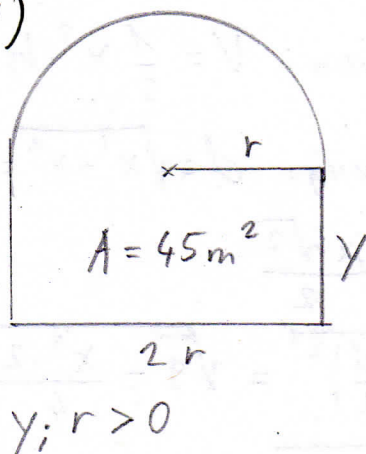


Nr. 11)



Zielfunktion $U = \frac{2 \cdot r \cdot \tilde{\pi}}{2} + 2y + 2r$

Nebenbedingung:

$$A = \frac{r^2 \cdot \tilde{\pi}}{2} + y \cdot 2r = 45$$

$$\Rightarrow y \cdot 2r = 45 - \frac{r^2 \cdot \tilde{\pi}}{2} \quad | : 2r$$

$$y = \frac{45}{2r} - \frac{r^2 \cdot \tilde{\pi}}{2 \cdot 2r} = \frac{45}{2r} - \frac{\tilde{\pi} \cdot r}{4}$$

Einsetzen in Zielfunktion:

$$U(r) = r \cdot \tilde{\pi} + 2 \cdot \left(\frac{45}{2r} - \frac{\tilde{\pi} \cdot r}{4} \right) + 2r = r \cdot \tilde{\pi} + \frac{45}{r} - \frac{\tilde{\pi} r}{2} + 2r$$

$$U(r) = \frac{r \cdot \tilde{\pi}}{2} + 2r + \frac{45}{r}$$

Extrema notw. Bed. $U'(r) = \frac{\tilde{\pi}}{2} + 2 - \frac{45}{r^2} = 0$

$$\Rightarrow \frac{45}{r^2} = \frac{\tilde{\pi}}{2} + 2 \quad | \cdot r^2 \Rightarrow 45 = \left(\frac{\tilde{\pi}}{2} + 2 \right) \cdot r^2 \quad | : \left(\frac{\tilde{\pi}}{2} + 2 \right)$$

$$\Rightarrow r^2 = \frac{45}{\frac{\tilde{\pi}}{2} + 2} \Rightarrow r_{1(2)} = \left(\begin{matrix} + \\ - \end{matrix} \right) \sqrt{\frac{45}{\frac{\tilde{\pi}}{2} + 2}} \approx \underline{\underline{3,55}}$$

hinr. Bed $U''(r) = \frac{90}{r^3} \Rightarrow U''(3,55) = \frac{90}{(3,55)^3} > 0$

$$\Rightarrow \text{Für } r \approx 3,55 \text{ (m) und } y = \frac{45}{2 \cdot 3,55} - \frac{\tilde{\pi} \cdot 3,55}{4} \approx 3,55 \text{ (m)}$$

nimmt der Umfang ein globales Minimum an.