

$$c) f_4(x) = \ln(x^2 + 4) \quad 1 \text{ LE} \hat{=} 5 \text{ cm}$$

$$\ln(8) = f(x)$$

Umkehrfunktion von  $f_4(x)$  bilden!

$$\begin{aligned} f_4(x) = \ln(x^2 + 4) &= y \\ x^2 + 4 &= e^y \quad | -4 \quad | \sqrt{\phantom{x}} \\ x &= \sqrt{e^y - 4} \end{aligned}$$

$$\Rightarrow \underline{\underline{f_4^{-1}(x) = \sqrt{e^x - 4}}}$$

Nullstelle finden!

$$\begin{aligned} f_4^{-1}(x) = \sqrt{e^x - 4} &= 0 \quad | (\ )^2 \\ e^x - 4 &= 0 \quad | +4 \\ e^x &= 4 \quad | \ln \\ \underline{\underline{x}} &= \underline{\underline{\ln(4)}} \end{aligned}$$

Volumen der Schale bestimmen!

$$V = \pi \int_{x_1}^{x_2} (f(x))^2 dx$$

$$V = \pi \int_{\ln(4)}^{\ln(8)} (\sqrt{e^x - 4})^2 dx = \pi \int_{\ln(4)}^{\ln(8)} e^x - 4 dx$$

$$= \pi \left[ e^x - 4x \right]_{\ln(4)}^{\ln(8)} = \pi \cdot \left[ (e^{\ln(8)} - 4 \cdot \ln(8)) - (e^{\ln(4)} - 4 \cdot \ln(4)) \right]$$

$$= \pi \cdot [(-0,317 - (-1,545))] = \pi \cdot 1,228 \approx \boxed{3,858 \text{ LE}}$$

$$3,858 \text{ LE} \cdot 5 \text{ cm} = \boxed{19,29 \text{ cm}}$$