Aufgabe 3:

a) Freies Volumen Zylinder: $\frac{1}{4} r^2 \cdot \pi \cdot \ell$

Freies Kreissegment: $\frac{1}{2} r^2 (\varphi - \sin\varphi) \cdot \ell$

$$\frac{1}{4} r^2 \cdot \pi \cdot \ell = \frac{1}{2} r^2 (\varphi - \sin\varphi) \cdot \ell$$

$$\Rightarrow \frac{1}{2}\pi = (\varphi - \sin(\varphi)) \Leftrightarrow \sin(\varphi) - \varphi = -\frac{1}{2}\pi$$

b) $\sin(\varphi) - \varphi = -0.5\pi$

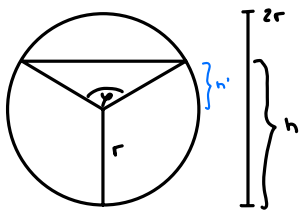
$\Rightarrow \sin(\varphi) + 0.5\pi = \varphi$

$$|x_n - x_{n+1}| < 10^{-3}$$

n	x_n
0	2.3
1	2.3165
2	2.3054
3	2.3129
4	2.3079
5	2.3112
6	2.30896
7	2.3105
8	2.3095

$\varphi = 2.310 \approx \underline{132.353°}$

c)



$h' = \cos\left(\frac{\varphi}{2}\right) \cdot r$

$h = r + h' = r + \cos\left(\frac{\varphi}{2}\right) \cdot r$