Aufgabe 1

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a)

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

$$D = \frac{1}{2}r\cdot\sin\frac{\varphi}{2}\cdot r\cdot\cos\frac{\varphi}{2} = \frac{1}{2}r^2\sin\frac{\varphi}{2}\cos\frac{\varphi}{2} = \frac{1}{4}r^2\sin\varphi$$

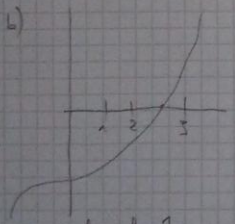
$$\Rightarrow \frac{1}{2}r^2(\varphi - \sin\varphi) = \frac{1}{4}r^2\pi + \frac{1}{2}r^2\sin\varphi$$

$$\Rightarrow \frac{1}{2}\varphi - \frac{1}{2}\sin\varphi = \frac{1}{4}\pi + \frac{1}{2}\sin\varphi$$

$$\Rightarrow \frac{1}{2}\varphi - \frac{1}{2}\sin\varphi = \frac{1}{4}\pi \Rightarrow \varphi - \sin\varphi = \frac{1}{2}\pi$$

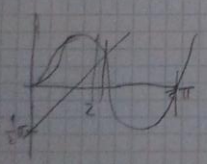
$$\Rightarrow f(\varphi) = \varphi - \sin\varphi - \frac{1}{2}\pi$$

b)



$$\Rightarrow \varphi_{n+1} = \varphi_n - \frac{f(\varphi_n)}{f'(\varphi_n)} = \varphi_n - \frac{\varphi_n - \sin\varphi_n - \frac{1}{2}\pi}{1-\cos\varphi_n}$$

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



n	φ_n
0	2.00
1	2.33
2	2.51
3	2.50
4	2.50

c) $h = r + r\cdot\cos\frac{\varphi}{2}$ (siehe a))