

$$\sum_{k=0}^{\infty} \frac{z^{2k+1}}{2^k} = z \sum_{k=0}^{\infty} \frac{z^{2k}}{2^k} = z \sum_{k=0}^{\infty} \left(\frac{z^2}{2} \right)^k = z \frac{1}{1 - \left(\frac{z^2}{2} \right)} = \frac{z}{1 - \frac{z^2}{2}} = \frac{2z}{2 - z^2} \quad \text{für } \frac{z^2}{2} < 1 \Rightarrow |z| < \sqrt{2}$$