

$$f_2(z) = 2 \cos z^2 + z^4 - 2 = 2 \sum_{n=0}^{\infty} \frac{(-1)^n}{(2n)!} z^{4n} + z^4 - 2 =$$

$$= 2 \sum_{n=2}^{\infty} \frac{(-1)^n}{(2n)!} \cdot z^{4n} = 2 \left(\frac{z^8}{4!} - \frac{z^{12}}{6!} + \dots \right) =$$

$$= 2 \underbrace{\left(\frac{z^8}{4!} - \frac{z^{12}}{6!} + \dots \right)}_{g(z)}$$