

Quiz 4

**Problem 1** Use the relation

$$\sin(z) = \frac{e^{iz} - e^{-iz}}{2i}$$

to show that  $\sin(z)$  is an antiderivative of  $\cos(z)$ .

**Solution:** Using the chain rule

$$\begin{aligned}\sin'(z) &= \left( \frac{e^{iz} - e^{-iz}}{2} \right)' \\ &= \frac{(e^{iz})' - (e^{-iz})'}{2} \\ &= \frac{ie^{iz} + ie^{-iz}}{2} \\ &= \cos(z).\end{aligned}$$

**Problem 2** Compute the derivative of

$$\cosh(z^2)$$

by using properties of derivatives and complex exponentials. **Solution:** Using the chain rule

$$\begin{aligned}(\cosh(z^2))' &= \sinh(z^2)(z^2)' \\ &= 2z \sinh(z^2).\end{aligned}$$