

Math 4213 - Complex Analysis

Quiz #19 - 2012.03.28

Solutions

1. Compute the residue at $z = 0$ of the function $f(z) = \frac{e^z - 1}{z^2}$.

There is a pole of order 1 at $z = 0$, so we have

$$\begin{aligned}\operatorname{Res}[f, 0] &= \frac{1}{(1-1)!} \lim_{z \rightarrow 0} \frac{d^{(1-1)}}{dz^{(1-1)}} z \frac{e^z - 1}{z^2} \\ &= \lim_{z \rightarrow 0} \frac{e^z - 1}{z} \\ &= 1\end{aligned}$$