Liouville's Theorem using D-modules

by

KAM-HANG HENRY CHENG
The Hong Kong University of Science and Technology
`henry.cheng@family.ust.hk`

We give basic ideas about using a D-module approach in complex analysis. Specifically, we establish analogues of Liouville's theorem, with the differential operator replaced by various difference operators. The extraction of series coefficients is done algebraically using a residue map that measures the obstruction to having local "antiderivative". The residue map is based on a Weyl algebra or q-Weyl algebra structure satisfied by each corresponding operator. This explains the different senses of "boundedness" required by the respective analogues of Liouville's theorem. This is a joint work with Yik-Man Chiang and Avery Ching.