1145-16-795   **Meric Augat*** (`mlaugat@ufl.edu`). *The Free Grothendieck Theorem.*

A remarkable pair of theorems of Grothendieck say if $p : \mathbb{C}^g \to \mathbb{C}^g$ is an injective polynomial, then p is bijective and its inverse is a polynomial. We prove a free analog of this. Recall that a free polynomial mapping in g freely non-commuting variables sends g-tuples of matrices (of the same size) to g-tuples of matrices (of the same size).

Our result is as follows; if p is a free polynomial mapping that is injective, then it has a free polynomial inverse. We will make use of a free version of the Jacobian Conjecture as well as results from free analysis, formal power series and skew fields. If there is enough time we will discuss the generalization of the theorem to free rational mappings.

The Free Grothendieck Theorem is related to free analysis, automorphisms of the free algebra and tame vs. wild automorphism of the free algebra. (Received September 14, 2018)