1154-11-1440 **Bernardo Bianco Prado***, bianc072@umn.edu, and **Kim Klinger-Logan**, kklingerlogan@ksu.edu. *Differential equations of infinite order and the zeta function.*

In Hilbert's 1900 address at the International Congress of Mathematicians, he claimed that the Riemann zeta function is not the solution of any algebraic ordinary differential equation on its region of analyticity. In a 2015 paper, Van Gorder addresses the question of whether the Riemann zeta function satisfies a non-algebraic differential equation. Van Gorder constructs a differential equation of infinite order that that Riemann zeta function satisfies. However, as he notes in the paper, this representation is clearly formal and Van Gorder does not attempt to claim a region or type of convergence. In our work we see that this operator applied to the Riemann zeta function does not in fact converge at any point and investigate what this means about Van Gorder's result. (Received September 15, 2019)