

1145-11-1422      **Jim Brown\*** (jim1b@oxy.edu), 1600 Campus Road, Los Angeles, CA 90041, and **Hugh Geller** (hgeller@g.clemson.edu), **Rico Vicente** (ricoevicente@gmail.com) and **Alexandra Walsh** (alexandra\_walsh@brown.edu). *When is the product of two Siegel eigenforms an eigenform?*

In the theory of modular forms, a very natural question to ask is when is the product of two eigenforms again an eigenform? The answer to this question in the case of elliptic modular forms was provided independently by Duke and Ghatge; they proved there are only finitely many such pairs and gave a complete list. The case of elliptic modular forms with non-trivial level was handled by Johnson. In REU work this past summer we considered this question for genus two Siegel modular forms. This case has added difficulties due to the fact there are not nice clean relations between the Fourier coefficients and Hecke eigenvalues. The REU students provided a complete list when the two eigenforms are taken to be Eisenstein series (there is only one pair.) We conjecture there are no cases where both eigenforms are cuspforms and provided a necessary condition for the product of two cuspidal eigenforms to be an eigenform. These two cases will be presented in a separate talk by the students. This talk will focus on work since the completion of the REU on the remaining cases where one eigenform is a cuspform and one is an Eisenstein series. There is one example in this case and we conjecture it is the only example. We provide easily checkable necessary conditions for this remaining case. (Received September 21, 2018)