Abstract: A beautiful result of Euler asserts that the number of ways to write a given positive number as a sum of odd integers is the same as the number of ways to write that number using distinct integers. For example,

\[
\begin{align*}
6 &= 1 + 1 + 1 + 1 + 1 + 1 & 6 &= 3 + 2 + 1 \\
6 &= 3 + 1 + 1 + 1 & 6 &= 4 + 2 \\
6 &= 3 + 3 & 6 &= 5 + 1 \\
6 &= 5 + 1 & 6 &= 6.
\end{align*}
\]

The Lecture Hall Theorem is a recent generalization of this result from the late 1990’s due to Bousquet-Mélou and Eriksson that has given rise to some fascinating combinatorics. In this talk, we give a new proof of the Lecture Hall Theorem and explore some connections to a certain group generated by affine reflections.

This is joint work completed during last summer’s REU at JMU with Lara Bradford, Meredith Harris, Alex Komarinski, Carly Matson, and Edwin O'Shea.