1135-34-2926 **Katie Elliott*** (katie_elliott@baylor.edu), Department of Mathematics, Baylor University, One Bear Place #97328, Waco, TX 76798-7328. *The Bessel Differential Equation and Left Definite Theory.*

The classical second-order Bessel differential equation in Sturm-Liouville form is $-y''(x) + \left(\nu^2 - \frac{1}{4}\right) x^{-2} y(x) = \lambda y(x)$ for all $x \in (0, \infty)$. We discuss the case when $\nu = 0$ and explore the maximal and minimal operators generated by the Bessel differential expression. We also study the square of the Bessel differential expression through it's Friedrichs extension. We look at the Second Left-Definite Theory of the Bessel differential expression and show that for $f \in H_2$, the second left-definite Hilbert space associated with the Friedrichs extension of the Bessel differential expression on $L^2(0, \infty)$), and for $\varepsilon > 0$, we have $\int_0^\infty |f''(x)|^2 \, dx \geq 2\varepsilon \int_0^\infty \left|\frac{f'(x)}{x}\right|^2 dx - \varepsilon(\varepsilon + 6) \int_0^\infty \left|\frac{f(x)}{x}\right|^2 dx$. In particular, the choice of $\varepsilon = 1/4$ gives the classic Bessel-Hardy inequality, thus arriving at this classic inequality from an alternate direction. (Received September 26, 2017)