1085-11-194 **Bruce C. Berndt*** (berndt@illinois.edu), Department of Mathematics, University of Illinois, Urbana, IL 61801. *A survey of Bessel function identities connected with the classical circle and divisor problems.*

Let $r_2(n)$ denote the number of representations of n as a sum of two squares, and let $d(n)$ denote the number of positive divisors of n. The classical circle and divisor problems ask for the correct orders of magnitude of the error terms in the asymptotic formulas for the summatory functions of $r_2(n)$ and $d(n)$, respectively. These error terms can be represented by infinite series of Bessel functions. We begin our survey with the classical results of Voronoi, Ramanujan, and Hardy, in particular. Secondly, we focus on two associated Bessel series expansions found in Ramanujan's lost notebook and the efforts of Sun Kim, Alexandru Zaharescu, and the speaker to prove them. We conclude our survey with some new Bessel series expansions by the same three authors that are motivated by the two expansions from the lost notebook. (Received September 10, 2012)