1067-33-306 **Bruce C. Berndt** (berndt@illinois.edu), Dept. of Mathematics, University of Illinois, 1409 W. Green St., Urbana, IL 61801, and **Byungchan Kim*** (bkim4@seoultech.ac.kr), School of Liberal Arts, SeoulTech, 172 Gongreung 2 dong, Nowongu, Seoul, 139-743, South Korea.
Asymptotic Expansions of Certain Partial Theta Functions.

In his second notebook, Ramanujan recorded an asymptotic expansion for the partial theta function

$$2\sum_{n=0}^{\infty}(-1)^n q^{n^2+n} = 2\sum_{n=0}^{\infty}(-1)^n \left(\frac{1-t}{1+t}\right)^{n^2+n} \sim 1+t+t^2+2t^3+5t^4+\cdots,$$

where $q=\frac{1-t}{1+t}\to 1^-$, or $t\to 0^+$. The first author established this asympotitic expansion giving an explicit representation for the coefficients in terms of Euler numbers. Later, R. Brent and W. Galway showed that the coefficients are positive integers, and, more recently, Richard Stanley found a combinatorial interpretation of these coefficients and so also established that they are positive integers.

The present authors examine the more general partial theta function

$$2\sum_{n=0}^{\infty}(-1)^n q^{n^2+bn} = 2\sum_{n=0}^{\infty}(-1)^n \left(\frac{1-t}{1+t}\right)^{n^2+bn} \sim \sum_{n=0}^{\infty} a_n t^n.$$

The coefficients a_n can be given in terms of Euler numbers and Hermite polynomials. Among other properties, the authors show, using a partial theta function identity of S. O. Warnaar, that if b is a positive integer, then the coefficients a_n are integers. (Received September 10, 2010)