1067-11-1462 **Paul Jenkins** and **Jeremy Rouse*** (rouseja@wfu.edu), Department of Mathematics, Wake Forest University, P.O. Box 7388, Winston-Salem, NC 27109. *Modular forms with non-negative Fourier coefficients and extremal lattices.*

If

$$f(z) = \sum_{n=1}^{\infty} a(n)q^n$$

is a cusp form of weight k for the full modular group it is known that there is a constant C_f so that

$$|a(n)| \leq C_f d(n) n^{\frac{k-1}{2}}.$$

Such a form $f(z)$ is determined by its first $\ell = \lceil \frac{k}{12} \rceil$ coefficients, and our first main result is a bound on C_f in terms of $a(1), a(2), \ldots, a(\ell)$.

We apply this result to the study of extremal lattices. The theta function of such a lattice will be the unique (non-cuspidal) modular form of weight k with

$$f(z) = 1 + O(q^{\ell+1})$$

and will have non-negative coefficients. We show that the form $f(z)$ has non-negative coefficients when $k = 81632$, but that some coefficients are negative when $k = 81644$. (Received September 21, 2010)