1035-11-507 **Ken Ono*** (`ono@math.wisc.edu`), Dept. of Mathematics, University of Wisconsin, Madison, WI 53711. *Heegner divisors, L-functions, and Maass forms.*

In work with Jan Bruinier, we extend work of Kohnen and Zagier and Waldspurger to obtain automorphic forms whose coefficients encode the vanishing and non-vanishing of quadratic twists of wgt 2 modular L-functions and their derivatives at the $s = 1$. Using Maass-Heegner divisors, we generalize Borcherds lifts to construct differentials of the third kind on modular curves. This construction, combined with work of Gross and Zagier, gives our results. As a special case, let G be a weight 2 newform with prime level p with the property that the sign of the functional equation of $L(G, s)$ is -1. We identify a Maass form

$$f(\tau) = \sum_{n \gg -\infty} c^+(n)q^n + \sum_{n<0} c^-(n)H(2\pi nv)q^n$$

which enjoys the following:

1. If $\Delta < 0$ is fund. disc. for which $\left(\frac{\Delta}{p}\right) = 1$, then

$$L(G, \chi_\Delta, 1) = 32\|G\|^2\|g\|^2\pi^2\sqrt{\Delta} \cdot c_g^-(\Delta)^2.$$

2. If $\Delta > 0$ is a fund. disc. for which $\left(\frac{\Delta}{p}\right) = 1$, then $L'(G, \chi_\Delta, 1) = 0$ if and only if $c_g^+(\Delta)$ is algebraic.

We obtain the general result for arbitrary levels and signs. (Received September 10, 2007)