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ERRATUM: "ON THE COMPUTATION OF LOCAL COMPONENTS OF A NEWFORM"

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Abstract. It has been brought to our attention that there is an error in Section 4 of our article, *On the computation of local components of a newform*, Math. Comp. 81, 2012. We briefly explain how this error can be corrected.

Proposition 4.1(1) of our article [2] is not correct as stated. For instance, if ε is the quadratic Dirichlet character of conductor 15, then there are two newforms in $S_3(\Gamma_1(15), \varepsilon)$ with coefficients in $\mathbf{Q}$, and these are twists of each other by the quadratic character of conductor 3, whereas the quantity u in the proposition is 0 here. We are grateful to Steve Donnelly of the University of Sydney for pointing out this counterexample.

The correct statement is the following. Let f be a newform of level Np^r, with $p \nmid N$, and character $\varepsilon = \varepsilon_N \varepsilon_p$, where ε_N has conductor prime to p and the conductor of ε_p is p^c. Let $u = \min(\lfloor \frac{r}{2} \rfloor, r - c)$.

Theorem. *In the notation of Proposition 4.1 of the article, if χ is a Dirichlet character of conductor p^v with $v > u$, then f_χ is new of level $Np^{\max(2v, c+v)} > Np^r$,* ***unless*** *$v = c$ and χ is of the form $\varepsilon_p^{-1}\chi'$, where χ' has conductor dividing p^{c-1}.*

In the latter case, the level of the newform $f \otimes \chi$ corresponding to f_χ is the same as that of $f \otimes (\chi')^{-1}$; in particular, it is strictly greater than Np^r unless χ' has conductor at most p^u.

Proof. By Theorem 3.1(ii) of [1], f_χ is new of level $Np^{\max(2v, c+v)}$, unless $\chi' = \varepsilon_p \chi$ has conductor strictly less than $p^{\max(c,v)}$, which is only possible if $c = v$.

We note that if $\chi' = \varepsilon_p \chi$, then $f \otimes \chi = \left(f \otimes (\chi')^{-1}\right) \otimes \nu^{-1}$, where $\nu = (\chi')^{-2}\varepsilon_p$ is the p-part of the nebentypus of $f \otimes (\chi')^{-1}$. Up to a scalar this is $W_p(f \otimes (\chi')^{-1})$, where W_p is the Atkin–Lehner operator at p. Hence $f \otimes \chi$ and $f \otimes (\chi'^{-1})$ have the same level at p, as claimed. $\square$

It follows immediately that the infimum of the levels of the newforms $f \otimes \chi$, as χ runs through the set of all Dirichlet characters of p-power conductor, is attained for some character of conductor at most p^u, although it will also be attained for some characters outside this range if $u < c$.

Hence in part (1) of both Proposition 4.2 and Proposition 4.4, "of p-power conductor" needs to be corrected to "of conductor dividing p^u", but the last sentence of each of these two propositions holds without modification and the algorithm described in §5 is still valid.

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References

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