This paper is dedicated to the one I love.

Abstract

This is a great paper. Read no further, because I don’t want you to hurt yourself, but if you can’t help yourself, better strap in. It gets bumpy from here on in.

1 Introduction

The results which follow will dwarf all others that have come before. It amazes me that I have been able to write them down. I know that you too will be duly impressed.

2 Preliminaries

What! You don’t know what I’m talking about!!

Let’s try a little fraktur \( \mathbb{A}, \mathbb{B}, \mathbb{C} \). Let’s try a little black board bold \( \mathbb{Z}, \mathbb{P}, \mathbb{Q}, \mathbb{R}, \mathbb{C} \). Let’s try some other symbols like \( x \gg 0 \) or \( \otimes \). How about \( M \otimes \mathbb{Z} N \) or \( \mathbb{Z}^{\mathbb{Z}} \)?

How about \( p \nmid N \) or \( \boxplus \)?

3 Some sample theorems

Lemma 3.1. Let’s put here exactly what we need to prove the next theorem.

Theorem 3.2. Let \( f \) be a nonzero element of \( S_{k/2}(4N, \psi) \). Then there exist an infinite number of square-free positive integers \( t \) such that \( S_t(f) \neq 0 \).

Proof. If \( S_t(f) = 0 \) for all but a finite number of square-free positive integers \( t \), then by Lemma 3.1 the Fourier coefficients of \( f \) are supported on only a finite number of square classes. By Theorem 3 of [3] the weight of \( f \) must be \( 1/2 \) of \( 3/2 \) and at weight \( 3/2 \) must be in the span of the theta series \( h_{\psi} \), contrary to assumption. \( \square \)

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By Theorem 3.2, we see that it we can always find nonzero Shimura lifts.

**Definition 3.3.** A horse is a horse of course, of course, but noone can talk to a horse of course . . . .

Here we have some displayed and aligned equations.

Here is an unnumbered displayed equation:

\[ T(m)T(n) = \sum_{d/(m,n)} d^{k-1} \chi(d)T(mn/d^2). \]

Here is a numbered displayed equation:

\[ T(m)T(n) = \sum_{d/(m,n)} d^{k-1} \chi(d)T(mn/d^2). \quad (3.1) \]

Here is the same expression, but inline and not displayed. Notice it is set smaller and the summation indices are placed differently: \( T(m)T(n) = \sum_{d/(m,n)} d^{k-1} \chi(d)T(mn/d^2) \). Note I need to use $ to surround my formula when in an inline mode.

For an aligned display we have

\[
\begin{align*}
\Lambda_N(s; f) &= \left( \frac{2\pi}{\sqrt{N}} \right)^{-s} \Gamma(s)L(s; f) \\
\Lambda_M(s; g) &= \left( \frac{2\pi}{\sqrt{M}} \right)^{-s} \Gamma(s)L(s; g)
\end{align*}
\]

A numbered version is given by

\[
\begin{align*}
\Lambda_N(s; f) &= \left( \frac{2\pi}{\sqrt{N}} \right)^{-s} \Gamma(s)L(s; f) \quad (3.2) \\
\Lambda_M(s; g) &= \left( \frac{2\pi}{\sqrt{M}} \right)^{-s} \Gamma(s)L(s; g) \quad (3.3)
\end{align*}
\]

A version with only one number associated to the group of equations is given by

\[
\begin{align*}
\Lambda_N(s; f) &= \left( \frac{2\pi}{\sqrt{N}} \right)^{-s} \Gamma(s)L(s; f) \\
\Lambda_M(s; g) &= \left( \frac{2\pi}{\sqrt{M}} \right)^{-s} \Gamma(s)L(s; g)
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\end{align*}
\]

Something with cases

\[
\phi_p(s) = \begin{cases} 
\frac{(1-b(p)p^{-s}+\psi(p)p^{k-1-2s})}{1-a(p)p^{-s}+\chi(p)p^{k-1-2s}} & \text{if } p \mid L \\
1 & \text{if } p \nmid L.
\end{cases}
\]
Theorem 3.4. Suppose that $N$ is an odd positive integer and $\psi$ is an even Dirichlet character defined modulo $4N$. Let $F \in S_{k-1}^+(N, \psi^2) \cup S_{k-1}^+(2N, \psi^2)$ be a normalized newform, and suppose that $S_{k/2}(4M, \psi, F) \neq 0$ for some $M | N$. Then

1. $M = N$

2. $S_{k/2}^-(4N, \psi) \cap S_{k/2}(4N, \psi, F) = \{0\}$, and so $S_{k/2}(4N, \psi, F) \subset S_{k/2}^+(4N, \psi)$.

3. If $N$ is square-free and $\psi^2 = 1$, then $S_{k/2}^+(4N, \psi)_K \subset S_{k/2}^+(4N, \psi)$.

Let’s get the other references in now. See [1] and [2].

References

