## NEWFORMS AND SPECTRAL MULTIPLICITY FOR $\Gamma_0(9)$

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## Abstract

We will discuss certain properties of automorphic forms on  $\Gamma_0(9)$ . In particular we will show that the "new" part of the spectrum of the Laplacian on  $\Gamma_0(9)$ \H exhibits multiplicities (in contrast to previous conjectures). To prove this fact we show that the space of automorphic forms (holomorphic and non-holomorphic) decomposes into an orthogonal sum of oldforms, twists and forms associated to newforms on another congruence subgroup of index and level 3. As a consequence of this decomposition we also see that there are no genuinely new forms on  $\Gamma_0(9)$  (i.e. they are all associated to newforms of lower level).