

$$N = 194 = 2 \cdot 97$$

By the Ibukiyama-Kitayama dimension formula,
 $\dim(S_4(K(194))) = 96$

By the Skoruppa-Zagier dimension formula and Jacobi restriction,
the lift dimension of $S_4(K(194))^+$ is 34
the nonlift dimension of $S_4(K(194))^+$ is heuristically 45
 $\dim(S_4(K(194))^+)$ thus is heuristically 79
 $\dim(S_4(K(194))^-)$ is heuristically 17

The heuristic dimensions are correct by the spanning results to follow

$\dim(J_{\{2,194\}}^{\{\text{cusp}\}}) = 3$ (Skoruppa-Zagier), so need to span to within 2 dimensions

$q = 5$ for TraceDown

After TD($\text{Grit}(J_{\{4,970\}}^{\{\text{cusp}\}})$) and $(\text{Grit}(J_{\{2,194\}}^{\{\text{cusp}\}}))^2$,
spanned rank in $S_4(K(194))^+$ is 79
spanned rank in $S_4(K(194))^-$ is 0

Hecke operators applied: $\{\{2, 2\}, \{2, 2\}, \{2, 1\}\}, \{\{2, 2\}, \{3, 1\}\}$

After Hecke spreading,
spanned rank in $S_4(K(194))^-$ is 13

After Borcherds products,
spanned rank in $S_4(K(194))^-$ is 17

Final spanned rank in $S_4(K(194))^+$ is 79

Final spanned rank in $S_4(K(194))^-$ is 17

$S_2(K(194))$ is determined by Jacobi restriction and the $H4Ndd(2,+)$ test
($H_4(194,2,2)^+ = 0$)

So $S_2(K(194)) = \text{Grit}(J_{\{2,194\}}^{\{\text{cusp}\}})$ (dimension 3)