The zeta function of $\mathfrak{g}_{1357A}$ counting ideals

1 Presentation

$\mathfrak{g}_{1357A}$ has presentation

$$\left\langle x_1, x_2, x_3, x_4, x_5, x_6, x_7 \;\middle|\; \begin{array}{c} [x_1, x_2] = x_4, [x_1, x_4] = x_5, [x_1, x_5] = x_7, \\ [x_2, x_3] = x_5, [x_2, x_6] = x_7, [x_3, x_4] = -x_7 \end{array} \right\rangle.$$

$\mathfrak{g}_{1357A}$ has nilpotency class 4.

2 The local zeta function

The local zeta function was first calculated by Luke Woodward. It is

$$\zeta^{\triangleleft}_{\mathfrak{g}_{1357A},p}(s) = \zeta_p(s)\zeta_p(s-1)\zeta_p(s-2)\zeta_p(s-3)\zeta_p(3s-4)\zeta_p(5s-5)\zeta_p(7s-6).$$

$\zeta^{\triangleleft}_{\mathfrak{g}_{1357A}}(s)$ is uniform.

3 Functional equation

The local zeta function satisfies the functional equation

$$\zeta^{\triangleleft}_{\mathfrak{g}_{1357A},p}(s)\Big|_{p\to p^{-1}} = -p^{21-19s}\zeta^{\triangleleft}_{\mathfrak{g}_{1357A},p}(s).$$

4 Abscissa of convergence and order of pole

The abscissa of convergence of $\zeta^{\triangleleft}_{\mathfrak{g}_{1357A}}(s)$ is 4, with a simple pole at $s = 4$.

5 Ghost zeta function

This zeta function is its own ghost.

6 Natural boundary

$\zeta^{\triangleleft}_{\mathfrak{g}_{1357A}}(s)$ has meromorphic continuation to the whole of $\mathbb{C}$.