The zeta function of p2mg counting all subgroups

1 Presentation

p2mg has presentation

$$\left\langle x, y, m, t \mid [x, y], t^2, m^2 = y, x^t = x, x^m = x^{-1}, y^t = y^{-1}, m^t = m^{-1} \right\rangle .$$

2 The zeta function itself

The zeta function was calculated by du Sautoy, McDermott and Smith. It is

$$\begin{aligned}\zeta_{\mathbf{p2mg}}(s) &= (1 - 4 \cdot 4^{-s})\zeta(s-1)^2 + (2 \cdot 2^{-s} + 3 \cdot 4^{-s})\zeta(s)\zeta(s-1) \\ &\quad + 2^{-s}\zeta(s-1)\zeta(s-2).\end{aligned}$$

3 Abscissa of convergence and order of pole

The abscissa of convergence of $\zeta_{\mathbf{p2mg}}(s)$ is 3, with a simple pole at $s = 3$. Since this group is a finite extension of a free abelian group, its zeta function has meromorphic continuation to $\mathbb{C}$.