Geometric and Asymptotic Group Theory II

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http://www.mat.univie.ac.at/∼dosaj/GGTWien/Course.html
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Blatt 5

The proof of Britton's lemma

Let $\mathrm{BS}(1,2) = \langle a, t \mid t^{-1}at = a^2\rangle$ act by "adjoining a generator on the left and reduction" on the set $X := \{t^i a^j t^{-k} \mid k, i \geq 0,\ j \in \mathbb{Z}\}/\sim$.

(1) Compute the action of any finite subsequence of the sequence $\cdots t^{-1}a^{p_1}t^{-1}a^{p_2}t^{-1}a^{p_3}\cdots$, for $p_i \in \mathbb{Z}$, on $1 \in X$ (i.e. $t^i a^j t^{-k}$ for $k = i = j = 0$).

(2) Compute the action of any finite subsequence of the sequence $ta^{2r+1}t^{-1}a^{p_1}t^{-1}a^{p_2}t^{-1}a^{p_3}\cdots$ on $1 \in X$.

(3) Compute the action of any finite subsequence of the sequence $\cdots ta^{s_3}ta^{s_2}ta^{s_1}ta^{2r+1}t^{-1}a^{p_1}t^{-1}a^{p_2}t^{-1}a^{p_3}\cdots$ on $1 \in X$.

(4) Conclude that an element of $\mathrm{BS}(1,2)$ represented by a reduced form is nontrivial.