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# On the Size and Connectivity of Graphs of Generating Sets of Finitely Generated Groups

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Let  $G$  be a finitely generated group with minimal generating set of size  $d$ . For each  $t \geq d$  let  $\Gamma_t = \Gamma_t(G)$  be the graph with vertex set  $V$  consisting of all generating  $t$ -tuples of elements of  $G$  and with edges  $^{1)}$  if for some distinct  $i$  and  $j$ ,  $g'_i$  is  $g_i$  multiplied on left or right by  $g_j^{\pm 1}$ , and all other  $g'_k$  are the same as the corresponding  $g_k$ .

Following work by Graham and Diaconis I examine connectivity properties of these graphs when  $G$  is abelian and when  $G$  is a small symmetric group. (For instance,  $|V(\Gamma_3(\Sigma_4))| = 10,080!!$ ). Pictures will be provided free of charge.

I will relate the size and connectivity properties of these graphs to classic counting problems of Phillip Hall.

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<sup>1)</sup>  $(g_1, \dots, g_t), (g'_1, \dots, g'_t)$

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