Each of the following groups is a familiar group in disguise. Figure out what groups these are! Win fame and prizes! Email answers to garfield@math.toronto.edu by midnight on the evening of December 16th. Some kind of proof is nice, but only required if you submitted the problem. Wrong answers may count against you.

1. $G_1 = \langle a, b, c, d \mid a^2 = d,\ b^2 = d^{-2},\ c^2 = ba^2b,\ d^3ab = c,\ a^2b^2 = d^3cb^{-1}a^{-1} \rangle$

2. $G_2 = \langle a, b \mid a^3 = 1,\ b^7 = 1,\ a^2b = b^3a^2 \rangle$

3. $G_3 = \langle a, b, c \mid a^5 = 1,\ b^{11} = 1,\ c^3 = 1,\ a^4b = b^2a^4,\ b^{10}c = c^2b^{10},\ ac = ca^4 \rangle$

4. $G_4 = \left\langle a, b, c, d, e, f, g, h \mid \begin{align*} a^3 &= c^6 = b, \quad &ca &= be^2, \quad &d^2a^3 &= h, \quad &h^2 = b = f^2, \quad &da &= gb, \quad &da^2da &= c, \quad &e^2f &= d^2, \quad &ca^2 &= h, \quad &c^a &= f, \quad &da^2 &= b^2e, \quad &da^2 &= c, \quad &da &= g \end{align*} \right\rangle$

5. $G_5 = \langle x, y, z \mid x^2 = 1,\ y^4 = 1,\ z^2 = 1,\ y^2z = 1,\ xyxy = 1,\ xy^{-1}zxy = 1 \rangle$