Group Cohomology – Etudes

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Exercise 1 (quasi-isometric embeddings)**.** We consider the metric space $\mathbb{R}$ with the standard metric. Which of the following maps $\mathbb{R} \longrightarrow \mathbb{R}$ are quasi-isometric embeddings?

1. $x \mapsto 2019 \cdot x + 2019$
2. $x \mapsto x^{2019}$
3. $x \mapsto \lceil 2019 \cdot x \rceil$
4. $x \mapsto \frac{1}{x^{2019}+1}$

Exercise 2 (Cayley graphs)**.** Sketch the following Cayley graphs!

1. $\mathrm{Cay}\big(\mathbb{Z} \times \mathbb{Z}/2, \{(1,0),(0,[1])\}\big)$
2. $\mathrm{Cay}\big(\mathbb{Z}^2, \{(1,0),(1,1),(0,1)\}\big)$
3. $\mathrm{Cay}\big(\mathbb{Z}^2, \{(1,2),(2,1)\}\big)$
4. $\mathrm{Cay}\big(D_{2019}, \{t,t'\}\big)$, where t and t' are two different reflections

Exercise 3 (the Hahn-Banach theorem)**.** Recall/look up the following terms and statements from functional analysis:

1. What is a bounded linear map?
2. What is the relation between boundedness and continuity for linear maps?
3. What does the Hahn-Banach theorem say?

Exercise 4 (GAP)**.** Figure out how to use GAP (https://www.gap-system.org/) to compute group (co)homology!

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no submission!