The Unit Distance Graph and the Axiom of Choice Instructor: Padraic Bartlett

# Homework 1: The Unit Distance Graph and the Axiom of Choice

*Week 5* *Mathcamp 2014*

1. Find $G$ such that
   - $G$ is a **unit distance graph**: i.e. we can draw $G$ in the plane with all of its edges given by straight line segments,
   - $\chi(G) = 4$, and
   - The chromatic number of any graph on fewer edges than $G$ is 3.
2. You can define the chromatic number of $\mathbb{Q}^2$ in the exact same way as we did for $\mathbb{R}^2$. Find $\chi(\mathbb{Q}^2)$.
3. Find $\chi(\mathbb{Q}^3)$.
4. (Open!) Find $\chi(\mathbb{Q}^4)$.