This is our Title*

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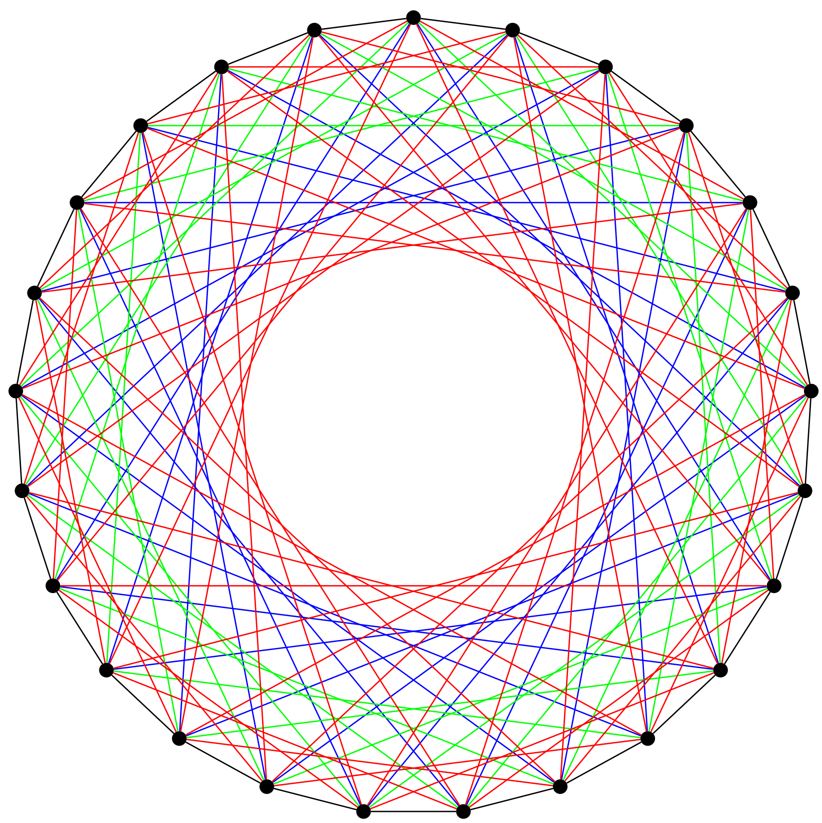

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Abstract

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1 Introduction

Let Γ be a finite group with a subset A. The *Cayley digraph*, denoted Cay(Γ,A), is a digraph with vertex set Γ, such that (x,y) is a directed edge if and only if $yx^{-1} \in$ A. In this paper we will be working with $\mathbb{Z}_m$ as our vertex set, and will denote these Cayley graphs as Cay(m,A).

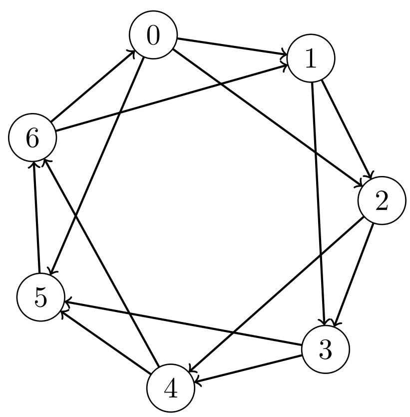

Figure 1: Cay($\mathbb{Z}_7$, {1,2}).

An important property of Cayley digraphs is the Cayley digraph Cay(m,A) is vertex-symmetric. This property allows us to define extremal functions for these digraphs. For any positive integer d we define

$$m(d, A) = \ max\{m|d(m, A) \leq d\},$$

the largest positive integer m such that the diameter, d(m,A), of the Cayley digraph Cay(m,A) is less than or equal to d. For positive integers d and k,

$$m(d, k) = \ max\{m(d, A) \mid \text{ there exists a set } A \text{ with } |A| = k\},$$

the maximum modulus m such that there exists a generating set with cardinality equal to k and the diameter of the Cayley digraph is less than or equal to d.

Current known bounds include

$$m(1, k) = k + 1,$$

$$m(d,1) = d + 1, \text{ and}$$

$$m(d,2) = \lfloor \frac{d(d+4)}{3} \rfloor + 1 \text{ for } d \geq 2.$$

In this paper we will examine the case when k = 3. A current lower bound for this case is

$$m(d,3) \geq \frac{176}{2197} d^3 + O(d^2).$$