

Peter E. Francis

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Education

Gettysburg College

MAJOR IN MATHEMATICS AND MINOR IN PHYSICS

- GPA: 4.21
- Received a Lincoln Scholarship, the highest merit-based scholarship.

Gettysburg, PA

Sept. 2017 - PRESENT

Publications

Maximal Sizes of Weak $(2, 1)$ -Sum-Free Sets in Finite Abelian Groups

Research Papers in Mathematics,

Gettysburg College

May 2020 (In Progress)

ADDITIVE COMBINATORICS

- ABSTRACT: The finite abelian group G is type I if $|G|$ has a prime divisor congruent to $2 \pmod 3$, type II if $|G|$ is divisible by 3 but has no divisors congruent to $2 \pmod 3$, and type III if all divisors of $|G|$ are congruent to $1 \pmod 3$. A subset $A \subset G$ is weakly $(2, 1)$ -sum-free if the set of all sums of 2 distinct elements of A is disjoint from A . We are interested in finding the size $\mu^{\wedge}(G, \{2, 1\})$ of the largest weak $(2, 1)$ -sum-free subset of G . Here, we determine $\mu^{\wedge}(G, \{2, 1\})$ for G of type I and some G of type II. We also present new constructions for weak $(2, 1)$ -sum-free sets for G of type III, and so find a new lower bound for $\mu^{\wedge}(G, \{2, 1\})$.

The Maximum Size of Weak (k, l) -Sum-Free Sets

Research Papers in Mathematics,

Gettysburg College

May 2019

ADDITIVE COMBINATORICS

- ABSTRACT: A subset A of a given finite abelian group G is called weakly (k, l) -sum-free if the set of all sums of k distinct elements of A is disjoint with set of all sums of l distinct elements of A . We are interested in finding the size $\mu^{\wedge}(G, k, l)$ of the largest weak (k, l) -sum-free subset in G . Here, we provide a new upper bound for $\mu^{\wedge}(G, k, l)$ as well as present new constructions for weak $(2, 1)$ -sum-free sets in some noncyclic groups.

Presentations

Philadelphia Area Math Conference

- Presented on my first and second paper of research on the maximum Size of Weak (k, l) -sum-free sets

Philadelphia, PA

Mar. 2021 (Upcoming)

Gettysburg Math Research Symposium

- Presented on my second paper of research on the Maximum Size of Weak (k, l) -sum-free sets

Gettysburg, PA

May. 2020 (Upcoming)

Gettysburg Math Research Symposium

- Presented on my first paper of research on the maximum Size of Weak (k, l) -sum-free sets

Gettysburg, PA

May. 2019

Experience

Department of Mathematics, Gettysburg College

LINEAR ALGEBRA PLA

- Wrote various Python projects as well as assist in teaching course material.

Gettysburg, PA

Jan. 2020 - PRESENT

CALCULUS PLA

- Assist Calculus II students in understanding concepts and course material.
- Lead class sessions once a week.

Feb. 2018 - PRESENT

CALCAID TUTOR

- Assist students in understanding concepts and course material at weekly review sessions.

Spring 2018, Fall 2018, Spring 2020

College Life Office and Office of Student Activities, Gettysburg College

(ADVANCED) TECHNICIAN

- Assist in instruction of technicians.
- Operate and organize audio, lighting and other production equipment for large and small events.

Gettysburg, PA

Sept. 2017 - PRESENT

Other Projects

graphPlot

Python

- Python module that uses a time-step simulation of charged particles and springs to find ideal plotting coordinated for nodes of planar and nonplanar graphs.

Jan 2020 - PRESENT

ifsFractals

Python

- Python module to generate fast fractals that are fixed points of iterated function systems.

Jan 2019 - PRESENT

Skills

Programming Python, \LaTeX , Java, MatLab, R, Sage

Web Flask with Python, HTML/CSS

Design Photoshop, Lightroom

Outdoors Backpacking, Canoeing, Wilderness Skills, PADI SCUBA Certified Open Water Diver

Honors & Awards

2019 **President**, Pi Mu Epsilon, Mathematics Honor Society

Gettysburg, PA

2019 **Winner**, Paul Mugabi Problem-Solving Award in Mathematics

Gettysburg, PA

2018 **Winner**, Dr. George R. Miller '19 and Dr. Richard T. Mara '46 First Year Student Prize in Physics

Gettysburg, PA

2017-20 **Recipient**, Dean's List

Gettysburg, PA

2017 **Member**, National Honor Society

Old Tappan, NJ