NCNTI'25 Abstracts Book

National Conference on Number Theory and its Interactions

Organized by the

National Higher School of Mathematics

01-02 December 2025

Algiers, Algeria

Contents

1. AIMS AND SCOPE

This conference aims to:

- Present the latest advances in the different branches of number theory.
- Highlight new methods and techniques for solving problems.
- Encourage collaboration between researchers from diverse institutions.
- Analyze connections with other disciplines like cryptography, combinatorics, algebraic geometry, and computer science.
- Provide a framework for exchange and discussion for young researchers and doctoral students.
- Encourage the creation of joint research projects and institutional collaborations.

2. CONFERENCE TOPICS

The conference will cover a wide range of subjects within modern number theory. Namely, the following topics:

1. Number Theory
2. Combinatorics
3. Coding Theory
4. Cryptography
5. Algebra
6. Algebraic Geometry
7. Algebraic Topology

3. ORGANIZING COMMITTEE

Name	Affiliation
Djemmada Yahia (Chair)	NHSM
Bouguebrine Soufyane	NHSM
Boumahdi Rachid	NHSM
Chergui Adnène	NHSM
Mehdaoui Abdelghani	NHSM
Tebtoub Assia Fettouma	NHSM

4. SCIENTIFIC COMMITTEE

Name	Affiliation
Rihane Salah Eddine (Chair)	NHSM
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Cherchem Ahmed	ENSIA
Farhi Bakir	NHSM
Maouche Youcef	USTHB
Trabelsi Nadir	University of Sétif
Benmezai Abdelhamid	NHSM
Zelaci Hacen	University of El Oued

5. PLANNING OF THE CONFERENCE

Monday, December 01, 2025

Time	Event / Speaker
08:00-08:45	Registrations
08:45-09:00	Opening ceremony
	Chair: Zelaci Hacen
09:00-09:50	**Farhi Bakir** *On q-Analogues of Bernoulli Numbers and Polynomials*
09:50-10:40	**Mehdi Salah** *Representation theoretic spectrum of locally symmetric spaces*
10:40-11:10	**Coffee break**
	Chair: Bayad Abdelmedjid
11:10-11:30	**Guerboussa Yassine** *Zeta Functions Associated to Cohomologically Trivial Modules Over Finite Groups*
11:30-11:50	**Mokhtari Soufyane** *On Inertia Groups in the Splitting Field of* $X^{p^n} + aX^s + a$
11:50-12:10	**Bekkis Chaima** *A Bijection Between Arndt Compositions and Non-Decreasing Dyck Paths*
12:10-12:30	**Bouchelaghem Abderraouf** *On the Linear Independence Measures Of Logarithms Of Rational Numbers*
12:30-12:50	**Djadi Chahinaze** *Congruence Properties for Combinatorial Triangle Coefficients*
12:50-14:10	**Lunch break**
	Chair: Dil Ayhan
14:10-14:30	**Mekkaoui Mohammed** *On the a-Points of the* k^{th} *Derivative of an L-Function in the Selberg Class*
14:30-14:50	**Rebaine Fatiha** *LCD Codes over Galois Rings*

Time	Event / Speaker
14:50-15:10	**Fegas Syrine** *Fibonacci-like Tilings and Partitions*
	Chair: Zaimi Toufik
15:10-15:30	**Miloudi Youssra** *On $D(1)$-Extension of a $D(-1)$-Triple Involving Fibonacci Numbers With Application*
15:30-15:50	**Ait-Amrane N. Rosa** *A New Perspective on Bicomplex Number System*
15:50-16:10	**Benatmane Sara** *A Hybrid DNA-Chaotic Cryptosystem Using Logistic Map, Rabin Key Exchange, and Feistel Diffusion*
16:10-16:30	**Himane Djamel** *Some Results Concerning the Exponential Diophantine Equation $a^x + b^y = z^2$*

Tuesday, December 02, 2025

Time	Event / Speaker
	Chair: Bouyakoub Abdelkader
08:00-08:50	**Zelaci Hacen** *Moduli Spaces of Γ-invariant Vector Bundles*
08:50-09:40	**Bayad Abdelmejid** *Results and problems on Dedekind sums*
09:40-10:30	**Dil Ayhan** *Finite Sums Involving r-Stirling Numbers via Transformation Formulas*
10:30-11:00	**Coffee break**
	Chair: Bakir Farhi
11:00-11:20	**Bahidj Nafaa and Tiffrent Chouaib** *Diophantine Approximations Attacks on RSA: Results and Generalizations*
11:20-11:40	**Atmani Sofiane Abdelhamid** *On Dedekind Eta Quotients Connecting to Eisenstein Series, and Ramanujan-type Identities*
11:40-12:00	**Nadji Mohammed Lamine** *The Behavior of the Connected Domination Number in Graphs*
12:00-12:20	**Briedj Yacine** *On the Existence of a $D(4)$ Diophantine Quadruple Involving Fibonacci Numbers*
12:20-12:40	**Zitouni Amel** *On the Infinite Intersection Property of Groups*
12:40-14:10	**Lunch break**
	Chair: Zaimi Toufik
14:10-14:30	**Seffah Safia** *A Study of a Diophantine Equation Involving Almost-Repdigits and Generalized Pell Sequences*
14:30-14:50	**Khattou Chouaib** *Some Arithmetic Properties of Bernoulli Numbers of Higher Order*
14:50-15:10	**Mehenni Abdelkrim** *Ordinal Sum Constructions on Non-associative Algebraic Structures*

Time	Event / Speaker
	Chair: Djemmada Yahia
15:10-15:30	**Nadjemi Halima** *On Carlitz Multipermutations*
15:30-15:50	**Bahri Boubakeur** *Some Results on Discrete Valuation Rings*
15:50-16:10	**Brahmi Adel** *The Intersection Between (l,m)-Antipalindromic Numbers and Generalized Fibonacci Numbers*
16:10-16:30	**Yettou Mourad** *Algebraic Boolean Equations*

6. KEYNOTE SPEAKERS

Results and problems on Dedekind sums

Abdelmejid Bayad

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Abstract

Under the influence of B. Riemann, R. Dedekind was interested in the behavior of the function $\eta(z)$, defined by

$$\eta(z) = e^{\frac{\pi i z}{12}} \prod_{n=1}^{\infty} \left(1 - e^{2\pi i n z}\right), \ \mathrm{Im}(z) > 0,$$

It should be noted that previously, Jacobi and Hermite had already considered this function in their work. However, it is R. Dedekind who studied it the most. More specifically, he examined the action of the modular group $SL_2(\mathbb{Z})$ on the Poincaré half-plane. Precisely, under the action of the matrices $\begin{pmatrix} a & b \\ c & d \end{pmatrix} \in SL_2(\mathbb{Z})$ with $c \neq 0$. He discovered an important formula involving the sums

$$s(d,c) = \sum_{k=1}^{|c|} \left(\left(\frac{k}{c}\right)\right)\left(\left(\frac{kd}{c}\right)\right)$$

commonly referred to as Dedekind sums, where $((x))$ denotes the "sawtooth" function. These sums play a crucial role in number theory. In this presentation, we will explore both historical results and recent advances regarding this topic. We will highlight the fundamental arithmetic properties of these sums, notably Dedekind's reciprocity law, as well as notions of density and equidistribution modulo 1. We will also establish connections between these sums and the special values of the partial zeta function associated with a number field, as well as the Euler class in cohomology. If time permits, I will also address three analogues of the Dedekind sums. These analogues represent multidimensional and elliptic generalizations that broaden our understanding of the properties and applications of Dedekind sums in more complex contexts. Furthermore, I will present some open problems that remain fascinating in number theory.

Keywords: *Dedekind sums, Number theory, Modular group, Zeta function, Reciprocity law, Equidistribution.*

Finite Sums Involving r-Stirling Numbers via Transformation Formulas

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Abstract

Transformation formulas are regarded as an important tool in mathematics, since they allow problems to be reformulated and various difficulties to be overcome. In this talk, attention is given to series transformation formulas involving the r-Stirling numbers of the first and second kind and also the r-Lah numbers, which are considered to play a central role in combinatorics. It is also shown how these transformation formulas lead to closed-form expressions for sums involving several well-known families of special numbers.

Keywords: *r-Stirling numbers, r-Lah numbers, Transformation formulas, Combinatorics, Special numbers, Finite sums.*

On q-Analogues of Bernoulli Numbers and Polynomials

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Abstract

This talk will present various q-analogues of Bernoulli numbers and polynomials. We will also introduce a new approach that allows for the re-derivation of the Carlitz version of q-Bernoulli numbers.

Keywords: *q-analogues, Bernoulli numbers, Bernoulli polynomials, Carlitz polynomials, Number theory.*

Representation theoretic spectrum of locally symmetric spaces

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Abstract

The LaplaceBeltrami operator on a compact Riemannian manifold is self-adjoint with a discrete spectrum. Nevertheless, on a pseudo-Riemannian manifold, even a compact one, the situation is much more complicated: it is not clear whether the Laplace-Beltrami operator is self-adjoint, and its spectrum need not be discrete. We will focus on the case of double cosets $\Gamma\backslash G/H$ where G is a non-compact semisimple real Lie group, H is a closed subgroup such that the homogeneous space G/H is symmetric and Γ is a discrete subgroup of G such that $\Gamma\backslash G/H$ is a compact pseudo-Riemannian manifold. We will show that, even though the group G does not act on the double coset space $\Gamma\backslash G/H$, the representation theory of G nonetheless allows for an explicit description of the joint spectrum of the entire commutative algebra $D(G/H)$ of G-invariant differential operators, acting on $\Gamma\backslash G/H$ via unbounded operators. If time permits we will relate our results to Number theory and automorphic forms. A large part of the presentation will be devoted to explaining the ins and outs, as well as the motivations, behind the issue, notably through numerous examples. This talk is based on a joint work with Martin Olbrich.

Keywords: *Representation theory, Lie groups, Locally symmetric spaces, Laplace-Beltrami operator, Automorphic forms, Spectral analysis.*

Moduli Spaces of Γ-invariant Vector Bundles

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Abstract

In this talk, we explore the moduli spaces of semistable Γ-invariant vector bundles on a smooth complex curve X, where Γ is a finite group acting via a Galois cover $X \to Y$. We focus in particular on the connected components of these moduli spaces. We then introduce a corresponding Hitchin system on the moduli space of invariant bundles and, in the case of smooth spectral curves, provide an explicit description of the Hitchin fibers: they are given by Γ-invariant line bundles on the spectral curve, equipped with a compatible Γ-action. This is joint work with Zakaria Ouaras.

Keywords: *Algebraic geometry, Moduli spaces, Vector bundles, Higgs bundles, Hitchin system, Galois cover.*

7. SPEAKERS

A New Perspective on Bicomplex Number System

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Abstract

This research introduces a novel category of bicomplex polynomials, with components represented by unrestricted generalized Fibonacci polynomials. We present various recurrence relations, summation formulas, the Binet formula, and the generating function associated with these polynomials. This is a joint work with H. Belbachir.

Keywords: *Bicomplex numbers, Fibonacci polynomials, Generating functions.*

On Dedekind eta quotients connecting to Eisenstein series, and Ramanujan-type Identities

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Abstract

In this presentation, we delve into the study of specific Eisenstein series of arbitrary weight that are associated with the congruence subgroups $\Gamma_0(p)$, where p represents the prime numbers 5, 7, and 13. We aim to provide explicit expressions for these Eisenstein series in terms of quotients of Dedekind eta functions of weight $\frac{1}{2}$. As a significant outcome of our investigation, we derive novel Ramanujan-type identities that pertain to partition functions, which are intricately linked to particular eta quotients. Our methodology is firmly grounded in the rich theory of modular forms constructed from eta quotients, and it draws upon the foundational works of mathematicians such as Fine, Kolberg, and Garvan, who have made substantial contributions to the understanding of Eisenstein series. What sets our approach apart is its fundamental divergence from the techniques previously utilized by renowned figures such as Ramanujan, Zuckerman, Carlitz, and others. By employing this innovative framework, we not only enhance the existing body of knowledge surrounding Eisenstein series and modular forms but also open new avenues for exploring the connections between these mathematical constructs and partition theory. This talk promises to shed light on the intricate relationships between these areas and to present fresh insights that could inspire further research in the field. This is a joint work with A. Bayad.

Keywords: *Eisenstein series, L-function, partition functions, Eta function, Eta quotients, Legendre symbols, divisors functions, modular functions, Hauptmodul.*

A bijection between Arndt Compositions and Non-Decreasing Dyck Paths

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Abstract

We establish a bijective correspondence between Arndt compositions and a special family of Dyck paths, namely non-decreasing Dyck paths, whose valleys occur at weakly increasing heights. This bijection provides a direct combinatorial interpretation of enumerative results previously obtained for these two objects, and highlights structural parallels between compositions and lattice paths. Our construction preserves natural statistics such as the number of parts in a composition and the number of valleys in a path. This is a jiontely work with A. Belkhir and H. Belbachir.

Keywords: *Arndt compositions; Dyck paths; non-decreasing Dyck paths; bijections in combinatorics; odd-indexed Fibonacci numbers*

A Hybrid DNA–Chaotic Cryptosystem Using Logistic Map, Rabin Key Exchange, and Feistel Diffusion

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Abstract

Information security requires new approaches beyond traditional cryptography. Chaos-based methods offer strong randomness and sensitivity to initial conditions, making them suitable for secure key generation. In this work, we propose a symmetric encryption scheme combining DNA encoding with the Logistic map to construct a robust keystream. A Rabin key exchange ensures secure seed distribution, while a Feistel-inspired structure enhances diffusion. Results show that the integration of DNA and chaotic dynamics provides strong security and efficiency, highlighting the potential of Logistic chaos in modern cryptography. This is a joint work with K. Guenda and A. Ben Mabrouk.

Keywords: *DNA cryptography, chaotic map, Logistic map, one-time pad, Rabin cryptosystem, Feistel network, hybrid encryption.*

Diophantine Approximations Attacks on RSA: Results and Generalizations

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Abstract

The RSA cryptosystem remains a widely deployed standard for securing digital communications. In practical scenarios, particularly on constrained or low-power devices, there is often a temptation to optimize performance by selecting a short secret exponent d. This work investigates the security implications of such choices, demonstrating how performance-driven optimizations can render RSA vulnerable to cryptanalysis based on Diophantine approximations. We provide a mathematical overview of the necessary tools, including Lagrange's theorem and continued fraction expansions. The presentation details the foundational attack by Wiener, which breaks RSA in polynomial time when $d < \frac{1}{3}N^{1/4}$. Furthermore, we explore subsequent generalizations by de Weger, Nitaj, and Nassr et al., which extend these vulnerabilities to cases involving partial knowledge of the prime factors. The results underscore that reducing the size of the secret exponent or using arithmetically structured public keys significantly compromises the hardness of the factorization problem. We conclude with recommendations for secure parameter selection, emphasizing the necessity of using balanced large primes and sufficiently large secret exponents to resist these Diophantine approximation-based attacks.

Keywords: *RSA Cryptosystem, Diophantine Approximations, Continued Fractions, Wiener's Attack, Cryptanalysis, Small Private Exponent, Integer Factorization.*

Some Results on Discrete Valuation Rings

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Abstract

We introduce some invariants to understand how the structures of modules change when transitioning between different discrete valuation rings (DVRs). Specifically, we define transformation invariants $f_{c,l}(\lambda)$ to track modifications in integer partitions that reflect how the invariant factors of torsion modules evolve. For DVR extensions characterized by a ramification index e and residue degree d, we show that a module with partition λ can be expressed as a direct sum of simpler modules, represented as $\bigoplus_{i\geq 1}(\sigma/p^i)f_{c,i}(\lambda)d$. This relationship plays a crucial role in the study of finite p-groups, especially concerning automorphism actions and the non-inner automorphism conjecture.

Keywords: *Discrete valuation rings, p-groups, Eisenstein polynomials, integer partitions, non-inner automorphisms.*

The Intersection Between (l,m)-Antipalindromic Numbers and Generalized Fibonacci Numbers

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Abstract

Let $k \geq 2$. Some generalizations of the well-known Fibonacci sequence is the k-Fibonacci. For this sequence the first k terms are $0,\ldots,0,1$ and each term afterwards is the sum of the preceding k terms. In this presentation, our main objective is to find all k-Fibonacci numbers which are (l,m)-antipalindromic numbers, i.e., numbers with a base 10 representation as follows

$$\underbrace{a\cdots a}_{\ell \text{ times}}\underbrace{b\cdots b}_{m \text{ times}}\underbrace{(10-a)\cdots(10-a)}_{\ell \text{ times}}.$$

This is a joint work with A. Ait Mokhtar and S. E. Rihane.

Keywords: *k-Fibonacci numbers, (l,m)-antipalindromic numbers, Linear form in logarithms, Reduction method.*

On the Existence of a $D(4)$ Diophantine Quadruple involving Fibonacci Numbers

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Abstract

We show that there is no Diophantine quadruple, that is, a set of four positive integers $\{a_1, a_2, a_3, a_4\}$ such that $a_i a_j + 4$ is a square for all $1 < i < j < 4$, consisting of Fibonacci numbers. This is a joint work with S. E. Rihane.

Keywords: *Diophantine sets, Fibonacci numbers, Linear forms in logarithms, Elliptic curves.*

On the Linear Independence Measures Of Logarithms Of Rational Numbers

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Abstract

In this talk, we give a general method to compute the linear independence measure of $1, \log(1 - 1/r), \log(1 + 1/s)$ for infinite many integers r and s. We give also improvements for the specials cases when $r = s$, we then have, for example, $\nu(1, \log 3/4, \log 5/4) \leq 9.197$.

Keywords: *Irrationality measure, Linear independence measure, Saddle point method.*

Congruence Properties for Combinatorial Triangle Coefficients

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Abstract

Let p be a prime number and let $T(n,k)$ denote the (n,k)-th Delannoy Triangle coefficient. In the present work, we revisit and extend our previous study (9th Scientific Days of the RECITS Laboratory) on Wolstenholme-type congruences for Delannoy numbers. We establish new congruential identities modulo higher powers of primes and provide alternative proofs based on Morley's congruence and harmonic number expansions. These results refine the classical congruence

$$\binom{2p-1}{p-1} \equiv 1 \pmod{p^3},$$

and highlight analogies between Delannoy and binomial coefficients in the context of modular arithmetic. The present version includes additional generalizations to $T(np,mp)$ and discusses their relation to Lucas-type congruences. This is a joint work with H. Belbachir.

Keywords: *Delannoy Triangle coefficient; Wolstenholme's Theorem; Lucas; Congruences.*

Fibonacci-like tilings and partitions

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Abstract

Inspired by the Fibonacci sequence, we introduce a new variant of tiling problems on $(1 \times n)$ -boards, which we call Fibonacci-like tiling $n \geq 3$ In contrast to the classical setting, where tiles may have arbitrary length $l \geq 1$, we impose a Fibonacci-type restriction: starting with the third tile, the length of each tile must equal the sum of the lengths of the two preceding tiles, and the second tile cannot be shorter than the first one. We then establish a correspondence between these tilings and restricted integer partitions, which we call Fibonacci-like partitions, where parts satisfy the same recurrence. We derive the generating functions and explicit formulas for the number of such tilings and partitions. Finally, we explore asymptotic properties and combinatorial identities related to these new structures. This is a joint work with H. Belbachir and L. Nemeth.

Keywords: *tiling, integer partition, Fibonacci sequence, generating function.*

Zeta functions associated to cohomologically trivial modules over finite groups

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Abstract

We associate a zeta function to any finite G-module M (where G is a finite group) which is cohomologically trivial. We show how such zeta functions are related to p-adic integrals and, in particular, how the latter can be used to establishing the rationality (in p^{-s}) of these zeta functions. If time allows, we shall discuss a notion of 'indexed posets'which arises naturally in the previous contextand how basic combinatorial ideas can be used in studying the zeta functions associated to them.

Keywords: *group cohomology, zeta functions, p-adic integrals, indexed posets*

Some Results Concerning the Exponential Diophantine Equation $a^x + b^y = z^2$

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Abstract

We study the Diophantine equation of the title under congruence conditions on a and b modulo two primes p and q, together with the Legendre symbol $\left(\frac{a}{q}\right)$. As a consequence, we obtain results on its solvability in connection with Fermat numbers, Mersenne numbers, and Chebyshev polynomials of the first kind.

Keywords: *Exponential Diophantine equations, Legendre symbol, Fermat numbers, Mersenne numbers, Chebyshev polynomials.*

Some arithmetic properties of Bernoulli numbers of higher order

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Abstract

Let r be any positive integer. We define the sequence of Bernoulli numbers of order r, denoted by $B_n^{(r)}$ $(n \geq 0)$, by the generating function:

$$\left(\frac{t}{e^t-1}\right)^r = \sum_{n=0}^{+\infty} B_n^{(r)} \frac{t^n}{n!} \quad (|t| < 2\pi).$$

The numbers $B_n^{(r)}$ are rational numbers. In this talk, we present some new identities and congruences involving the numbers $B_n^{(r)}$. This is a joint work with A. Bayad and M. Hernane.

Keywords: *Bernoulli numbers of higher order, Stirling numbers, Congruences.*

Ordinal Sum Constructions on Non-associative Algebraic Structures

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Abstract

The study aims to investigate t-norm functions on lattice structures that contain cycles, moving beyond the traditional frameworks of totally ordered or acyclic lattices. Introducing cycles adds complexity, necessitating the development of new approaches that extend classical models. This research focuses on adapting ordinal sum techniques, or proposing new axioms and definitions, to construct t-norm functions suited to the nonlinear nature of such lattices. Thus, it seeks to expand the theoretical and practical foundations of t-norms within non-associative algebraic structures.

Keywords: *Psoset, Trellis, Binary Operation, Associative Element, Transitive Element.*

On the a-points of the k^{th} derivative of an L-function in the Selberg Class

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Abstract

Let $F(s)$ be an L-functionn from the Selberg class, $F^{(k)}(s)$ be the k^{th} derivative of $F(s)$ and a be a complex number. The solutions of $F^{(k)}(s) = a$ are called a-points of $F^{(k)}(s)$. In this presentation, we discuss the distribution of the a-points of $F^{(k)}(s)$ and estimate the number of these a-points.

Keywords: *L-functions, Selberg class, Value distribution.*

On $D(1)$-extension of a $D(-1)$-triple involving Fibonacci numbers with application

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Abstract

In this talk, we study the $D(1)$-extension of the $D(-1)$-triple $\{F_k, F_{k+4}, F_{k+2} + 2F_{k+1}F_{k+3}\}$ involving Fibonacci numbers. We prove that such an extension is unique. This is a joint work with S. E. Rihane.

Keywords: *Diophantine sets, Fibonacci numbers, Linear forms in logarithms, Elliptic curves.*

On Inertia Groups in the Splitting Field of $X^{p^n} + aX^s + a$

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Abstract

Let p be an odd prime number, $n \geq 3$ and $s < p^n$ be rational integers such that $(s, p) = 1$, and a be a rational integer divisible by p exactly once. Denote by N the splitting field of $f(X) = X^{p^n} + aX^s + a$ over $\mathbb{Q}$. We prove that if $(s, p^n - 1) = 1$ then the inertia group over p in $N/\mathbb{Q}$ is isomorphic to $AGL(1, p^n)$, the 1- dimensional affine group over the finite field $\mathbb{F}_{p^n}$. And if $l \neq p$ is a prime divisor of a, ramified in N, then the inertia group over l in $N/\mathbb{Q}$ is cyclic of order $\frac{p^n}{\gcd(p^n, v_l(a))}$, where $v_l(a)$ is the l-adic valuation of a. We further give sufficient conditions under which the Galois group of $f(X)$ is $AGL(1, p^n)$.

Keywords: *Inertia group, Ramification, Trinomials, Galois group.*

On Carlitz Multipermutations

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Abstract

In this talk, we define the Carlitz multipermutations and give some of their combinatorial and arithmetic properties. We also derive some nice combinatorial identities. This is a joint work with A. Belkhir.

Keywords: *Stirling numbers, Multipermutations, Combinatorial identities.*

The Behavior of the Connected Domination Number in Graphs

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Abstract

Let $G = (V, E)$ be a connected graph of order $n \geq 2$, and let u and v be two distinct vertices of G. We consider two operations applied to G: the k-multisubdivision and the k-path addition. In both constructions, k denotes the number of vertices added to V, yielding a new graph denoted by $G_{u,v,k}$. We establish that $\gamma_c(G) \leq \gamma_c(G_{u,v,k})$ for $k \geq 1$ in the case of the k-multisubdivision, where $uv \in E$. Furthermore, we show that $\gamma_c(G) - 2 \leq \gamma_c(G_{u,v,k})$ for $k \geq 0$ in the case of the k-path addition, where $uv \notin E$. In each case, we provide both necessary and sufficient conditions under which these inequalities hold. This is a joint work with M. Benatallah and I. Boufelgha.

Keywords: *Domination, Connected domination number, Multisubdivision, Path addition.*

LCD Codes over Galois Rings

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Abstract

Linear Complementary Dual (LCD) codes are linear codes whose intersection with their dual is trivial. These codes have applications in cryptography and side-channel attack countermeasures. In this talk, we investigate LCD codes over Galois rings, providing necessary and sufficient conditions for their existence and studying their properties. This is a joint work with K. Guenda.

Keywords: *LCD codes, Galois rings, Dual codes, Cryptography.*

A Study of a Diophantine Equation Involving Almost-Repdigits and Generalized Pell Sequences

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Abstract

For an integer $k \geq 2$, the k-Pell sequence is defined by the initial values $P_0^{(k)} = 0, P_1^{(k)} = \cdots = P_{k-2}^{(k)} = 0, P_{k-1}^{(k)} = 1$, and each term afterwards is given by the linear recurrence $P_n^{(k)} = 2P_{n-1}^{(k)} + P_{n-2}^{(k)} + \cdots + P_{n-k}^{(k)}$ for all $n \geq 2$. A repdigit is a number with identical digits, while an "almost repdigit" has all but one digit the same. Motivated by recent work on almost repdigits in generalized Fibonacci sequences, we aim to identify all such numbers within the k-Pell sequence. This is a joint work with S. E. Rihane and A. Togbé.

Keywords: *k-Pell numbers, Almost repdigits, linear forms in logarithms, reduction methods.*

Algebraic Boolean Equations

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Abstract

In this work, we study algebraic Boolean equations and their set of solutions. We provide a systematic method to solve such equations using the properties of Boolean algebras.

Keywords: *Boolean algebra, Boolean equations, Solutions.*

On the Infinite Intersection Property of Groups

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Abstract

A group G is said to satisfy the infinite trivial intersection property (ITIP for short), if for every pair of finite subgroups U, V such that $U \cap V = 1$, there exist infinite subgroups X and Y of G such $U \leq X$ and $V \leq Y$ and $X \cap Y = 1$. We say that a group G satisfies the infinite non-trivial intersection property (INIP) if every pair of infinite subgroups of G intersect non-trivially. In this talk, we shall give classes of groups that satisfy ITIP. We show, among other things, that every periodic locally nilpotent non-Chernikov group satisfies ITIP. The Prufer-by-finite p-groups are examples of locally nilpotent Chernikov groups that do not satisfy ITIP. We then describe locally nilpotent groups that satisfy INIP and structure theorems are given in the periodic and non-periodic case.

Keywords: *Locally nilpotent groups, Chernikov groups, Infinite intersection property.*

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