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## SCOPE of the MATHEMATICS EXAM

Programme of written exams - November 2017

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### PROGRAMME FOR 1 HOUR MCQ WRITTEN EXAM AND ORAL EXAM FOR BACHELOR STUDENTS IN PHYSICS AND ENGINEERING

#### **Linear algebra**

- Linear mappings, matrices
- Determinant, linear systems
- Eigenvalues, eigenvectors and eigenspaces of endomorphisms and square matrices

#### **Functions of one real variable**

- Continuity, differentiability
- Taylor expansion

#### **Real inner product spaces, Euclidean spaces**

#### **Sequences and series**

- Numerical sequences and series
- Sequences and series of functions

#### **Vector functions, parametrized curves**

#### **Integration on compact intervals, generalized integrals**

#### **Differential calculus**

#### **Linear differential equations**

#### **Linear differential systems of first order**

#### **Probability: Discret random variables**

- Laws, expectation, transfert theorem
- Random vectors, independence



## PROGRAMME FOR 2 HOURS WRITTEN EXAM AND ORAL EXAMS for BACHELOR STUDENTS IN MATHEMATICS

### **Algebraic structures**

- Groups, rings, fields, linear spaces
- Arithmetic in  $\mathbb{N}$
- Polynomials

### **Linear algebra**

- Linear mappings, matrices
- Determinant, linear systems
- Eigenvalues, eigenvectors and eigenspaces of endomorphisms and square matrices

### **Functions of one real variable**

- Continuity, differentiability
- Taylor expansion

### **Sequences and series**

- Numerical sequences and series
- Sequences and series of functions
- Power series

### **Real inner product spaces, Euclidean spaces**

### **Topology of $\mathbb{R}$ and normed vector spaces**

### **Vector functions, parametrized curves**

### **Integration on compact intervals, generalized integrals**

### **Differential calculus**

### **Linear differential equations**

### **Linear differential systems of first order**

### **Probability: Discret random variables**

- Laws, expectation, transfert theorem
- Random vectors, independence