

Math 223: Linear Algebra

Lecture 1

January 11th, 2021
Lior Silberman¹

January 11, 2021

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http://www.math.ubc.ca/~lior/teaching/2021/223_W01/

Practical Linearity

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About the
course

Start the
course

- Signal processing
- Electromagnetism
- Quantum mechanics.

Linearity in Mathematics I

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About the
course

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Theorem

Let f, g be real-valued functions on $[a, b]$ and let $\alpha, \beta \in \mathbb{R}$ be real numbers. Let $x_0 \in [a, b]$.

- *If f, g are continuous at x_0 then so is $\alpha f + \beta g$.*
- *If f, g are differentiable at x_0 then so is $\alpha f + \beta g$.*
- *If f, g are integrable on $[a, b]$ then so is $\alpha f + \beta g$.*

Linearity in Mathematics II

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Theorem

f, g, α, β, x_0 as above.

- If f, g are differentiable at x_0 then

$$(\alpha f + \beta g)'(x_0) = \alpha (f'(x_0)) + \beta (g'(x_0))$$

- If f, g are differentiable on $[a, b]$ then

$$(\alpha f + \beta g)' = \alpha f' + \beta g'$$

- If f, g are integrable on $[a, b]$ then

$$\int_a^b (\alpha f + \beta g)(x) dx = \alpha \int_a^b f(x) dx + \beta \int_a^b g(x) dx$$

Goals, a.k.a. what's hard in this course?

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About the
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Start the
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- Language of linear algebra.
- Abstract mathematics
 - Working with new definitions
 - Working with unspecific elements of abstract sets
 - Formal proofs
- “Honours” mathematics
 - For most problems you will need to find the *idea* that solves them.

Components of the course

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About the
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Start the
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- Classes (MWF 10:00-10:50)
- Office hours: after class and Tuesday nights
- Problem sets: weekly, mainly conceptual problems.
 - Practice & Supplementary problems.
- Two in-class midterms.
- Final exam
- Piazza

Resources

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About the
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Start the
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- Instructor
- Math Learning Center
- Fellow students
- Textbook
- Definitions: Wikipedia

On the web

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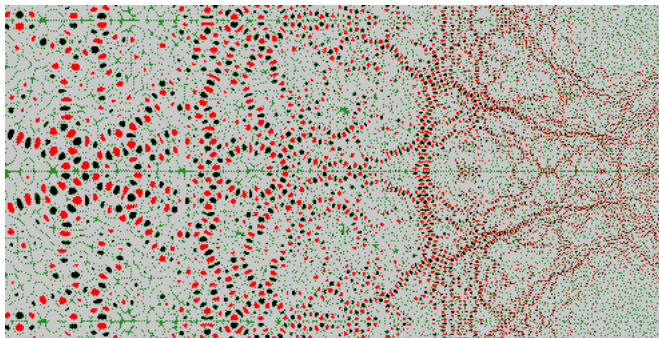
About the
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Start the
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- Course website: https://www.math.ubc.ca/~lior/teaching/2021/223_W21/
 - Syllabus; notes
 - Problem sets
 - Schedule, whiteboard scans
- Canvas
 - Homework submission
 - Solutions
 - Grades
- Piazza

About me

- Lior Silberman (Li'or Zilberman)
- Email: lior@math.ubc.ca, Office: MATX 1112
- Work: Number Theory, Geometry, Topology, Random structure, ...



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Change of viewpoint

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