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MathE-project

Improving Math skills in higher education

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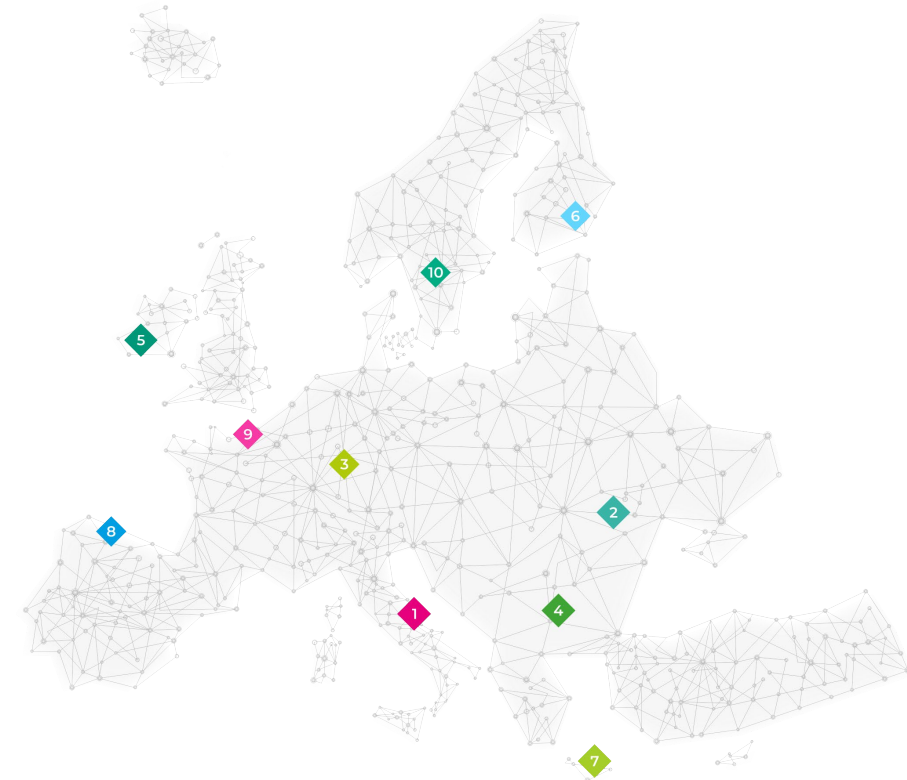
MARCEL ROMAN
„Gheorghe Asachi” Technical University





The context

- Students in science, engineering and economics programs in HEIs often lack the basic maths skills to effectively follow their lectures.
- They often attempt to memorize facts and rules instead of being able to approach & apply critical thinking in problem solving.



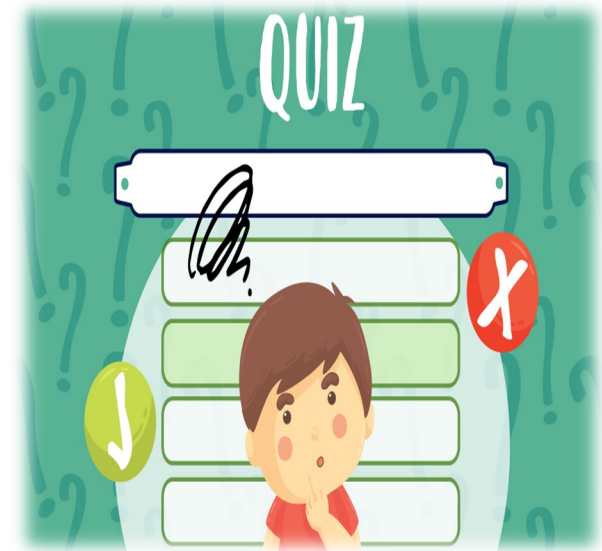


- Mathematics serves as language and instrument of science and technology.
- Being a fundamental discipline for many fields, but also a discipline that is more difficult to master, it is imperative to find more **friendly** learning methods.





- In mathematics as well, it is extremely important that, during the learning process, the feedback to be given as fast as possible! Thus, the students can immediately adjust and consolidate their knowledge.
- On the other hand, the effectiveness of game-based learning is well known. Learning math as if you play Quizzes is another advantage of the way the **MathE** platform is organized.



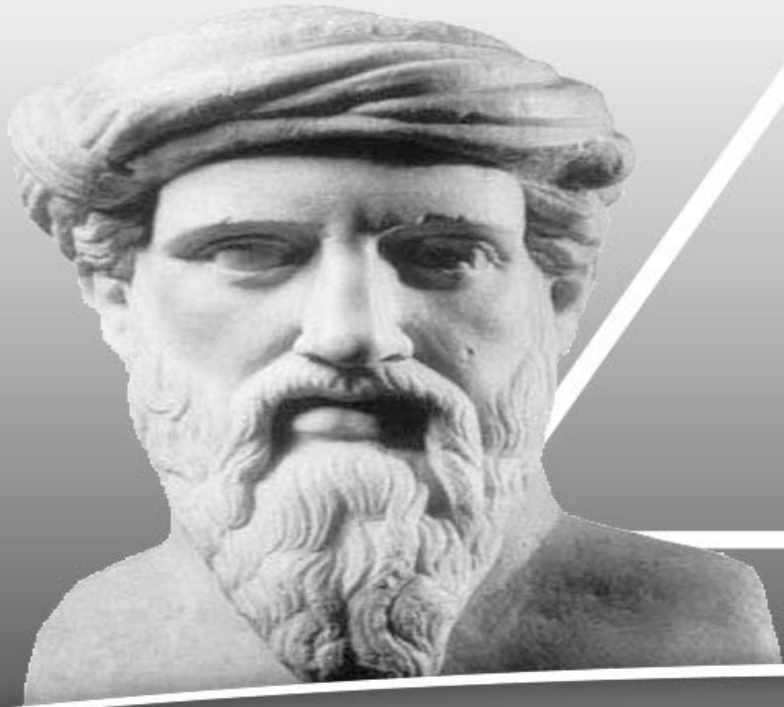


- To keep the mathematics community connected increases the efficiency of learning and teaching mathematics.



So, we thought to **Student's Community** and **Lecturer's Community**, a place where the two communities can share their experiences.

And, in an attempt to solve all these requirements, it appeared:



$$a^2 + b^2 = c^2$$

MathE

Improve Math Skills in Higher Education



- European Commission funded the MathE project (2018-2022) in the framework of the Erasmus+ Programme – Strategic Partnerships for Higher Education Action.
- Project number: [2018-1-PT01-KA203-047361](#)





Partners



Instituto
Politécnico de
Bragança
(coordinator)



Limerick
Institute of
Technology



Università
degli Studi di
Genova



„Gheorghe Asachi”
Technical
University of Iasi



Kaunas
Institute of
Technology



MathE Objectives

Enhance the quality of teaching and improve pedagogies and assessment methods by:

- Facilitating the identification of students' gaps in Math
- Providing Math teachers with appropriate digital sources
- Enhancing transnational sharing of innovative teaching sources



MathE Outputs

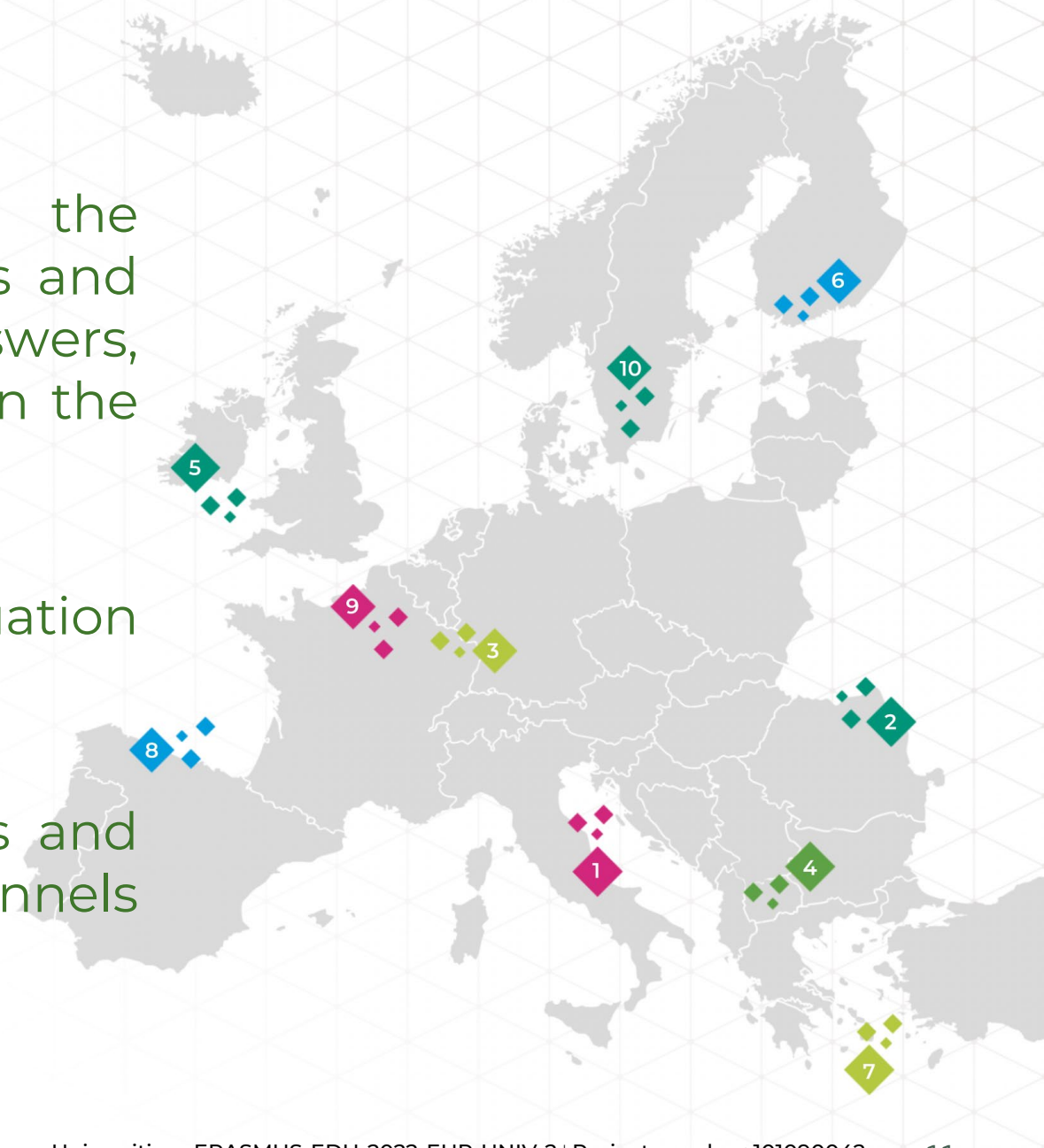
The main project tangible results:

- Students' Assessment Toolkit (Self-assessment and Final-assessment)
- Online Math Library of Video Lessons and Educational Material
- Teachers' and Students' Community of Practices





- The digital platform MathE enables the students to perform self-evaluation tests and immediately correct their wrong answers, directing the learner to the references on the Online Math Library or the video lessons.
- The professors can organize online evaluation sessions of the students.
- Both students and teachers can discuss and exchange opinions on two dedicated channels in the platform.





This project (2018-1-PT01-KA203-047361) has been funded with support from the European Commission. This web site reflects the views only of the author, and the Commission cannot be held responsible for any use which may be made of the information contained therein.



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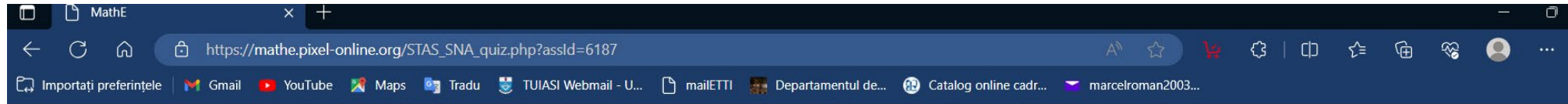
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WELCOME TO MATHE PROJECT

To Improve Math Skills in Higher Education

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... toolkit allows students to carry out a self-evaluation of their knowledge on 10 selected Math topics.

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Question 1

Topic: Differential Equations

Level: Basic

The general solution of the following differential equation

$$x' = 2t \cdot (1 + x^2),$$

where $x = x(t)$ is the unknown function, is:

Choose the right answer or skip to the next question.

Answer 1:

$$x(t) = \tan(t^2)$$

Answer 2:

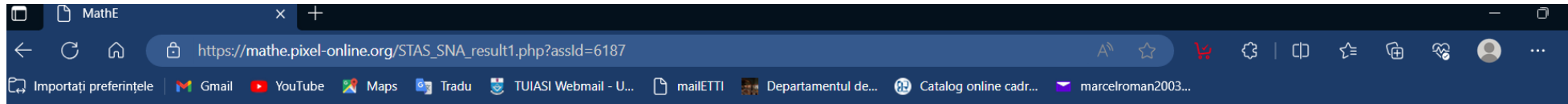
$$x(t) = \tan(t^2 + C), \quad C \in \mathbb{R}$$

Answer 3:

$$x(t) = \arctan(t^2 + C), \quad C \in \mathbb{R}$$

Answer 4:

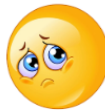
$$x(t) = \arctan(t^2)$$



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This toolkit allows students to carry out a self-evaluation of their knowledge on 10 selected Math topics.

Topic: Differential Equations
Level: Basic



The number of correct answers is 3 on a total number of 7 questions.
Your performance is not good and it would be advisable to go back to the theory

Question 1

The general solution of the following differential equation

$$x' = 2t \cdot (1 + x^2),$$

where $x = x(t)$ is the unknown function, is:

Your answer is WRONG:



$$x(t) = \arctan(t^2)$$


[Report an error](#)



The general solution of the following differential equation


where $x = x(t)$ is the unknown function, is:

Your answer is WRONG:

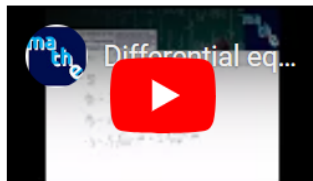
 $x(t) = \arctan(t^2)$

[Report an error](#)

The correct answer is:

 $x(t) = \tan(t^2 + C), \quad C \in \mathbb{R}$

You might want to have a look at



Differential equation with separate variables
"Gheorghe Asachi" Technical University Iasi
Solving a differential equation with separate variables
Languages: English



Separate variables differential equation
"Gheorghe Asachi" Technical University Iasi
Solving of a separate variables differential equation.
Languages: English



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$$x'(t) = \frac{t^2 \cdot x^2(t)}{1+t^2}, \quad x(t) \neq 0$$

differential equation with separate variables

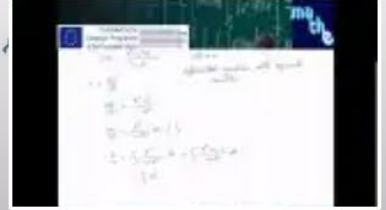
$$x' = \frac{dx}{dt}$$

$$\frac{dx}{dt} = \frac{t^2 \cdot x^2}{1+t^2}$$

$$\frac{dx}{x^2} = \frac{t^2}{1+t^2} dt \quad | \int$$

$$-\frac{1}{x} = \int \frac{t^2}{1+t^2} dt = \int \frac{t^2+1-1}{1+t^2} dt$$
$$= \int dt - \int \frac{1}{1+t^2} dt =$$

Trage în sus pentru o căutare mai precisă



1:41



You might want to have a look at

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Differential eq...
Ecran complet (f)

[Differential equation with separate variables](#)

"Gheorghe Asachi" Technical University Iasi

Solving a differential equation with separate variables

Languages: English



[Separate variables differential equation](#)

"Gheorghe Asachi" Technical University Iasi

Solving of a separate variables differential equation.

Languages: English

Teaching Material

Riccati differential equation

Ariadna Lucia Pletea

Type of Product: Notes

Languages: English

Files:
[Ricatti.pdf](#)

Riccati differential equation is presented and two examples are completely solved.

Differential Equation with Separable Variables

Marcel Roman

Type of Product: Article, Exercises, Notes

Languages: English

Files:
[SeparabVarEq.pdf](#)

Differential Equation with Separable Variables and one solved example are presented. Also, another 8 exercises are proposed.

Question 2



MathE - project

Differential Equation with Separable Variables

Definition Let f_1, f_2 defined on $a \leq x \leq b$ and g_1, g_2 defined on $c \leq y \leq d$, continue, such that $f_2(x) \neq 0$, $g_2(y) \neq 0$. A differential equation of the form

$$f_1(x)g_1(y) + f_2(x)g_2(y)y' = 0 \Leftrightarrow f_1(x)g_1(y)dx + f_2(x)g_2(y)dy = 0. \quad (1)$$

called equation with separable variable.

For this equation we have the next result

Proposition The general solution of the equation (1) is given by an implicit function in the following form

$$\int \frac{f_1(x)}{f_2(x)} dx + \int \frac{g_1(y)}{g_2(y)} dy = C, \quad C \in \mathbb{R}$$

Proof. It is easy to see that the equation (1) can be rewrite as follows

$$\frac{f_1(x)}{f_2(x)} = -\frac{g_1(y)}{g_2(y)}$$

and by integrating each side of the above equation we obtain the desired result.

Example. Integrate the next equation

$$(1+x^2)dy + ydx = 0$$

Solution. The equation above is of the separable variable, and thus we have

$$(1+x^2)dy + ydx = 0, \quad \rightarrow \quad \frac{dx}{1+x^2} = -\frac{dy}{y} \quad \rightarrow \quad \int \frac{dx}{1+x^2} = -\int \frac{dy}{y} \quad \rightarrow$$
$$\arctg x = -\ln y + C \quad \rightarrow \quad \arctg x + \ln y = C$$

Exercises. Solve the next differential equations

1. $yy' = -2x \operatorname{cosec} y$,
2. $y' + \cos(x+2y) = \cos(x-2y)$,
3. $2x(2 \cos y - 1)dx = (x^2 - 2x + 3)dy$,
4. $y' = \frac{\cos y - \sin y - 1}{\cos x - \sin x - 1}$



MathE

https://mathe.pixel-online.org/STAS_FA.php

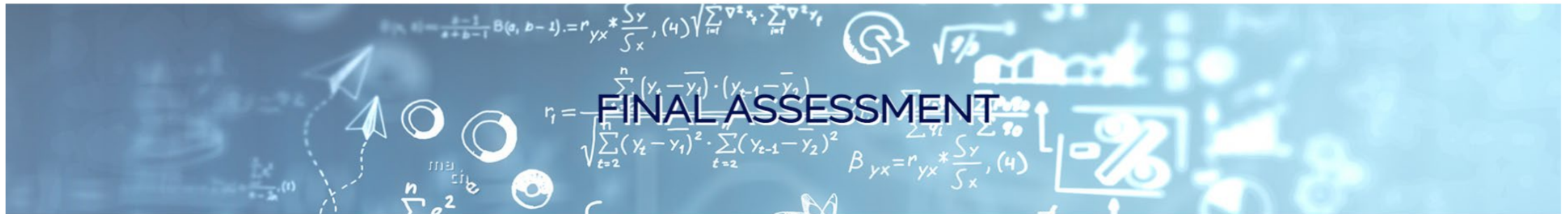
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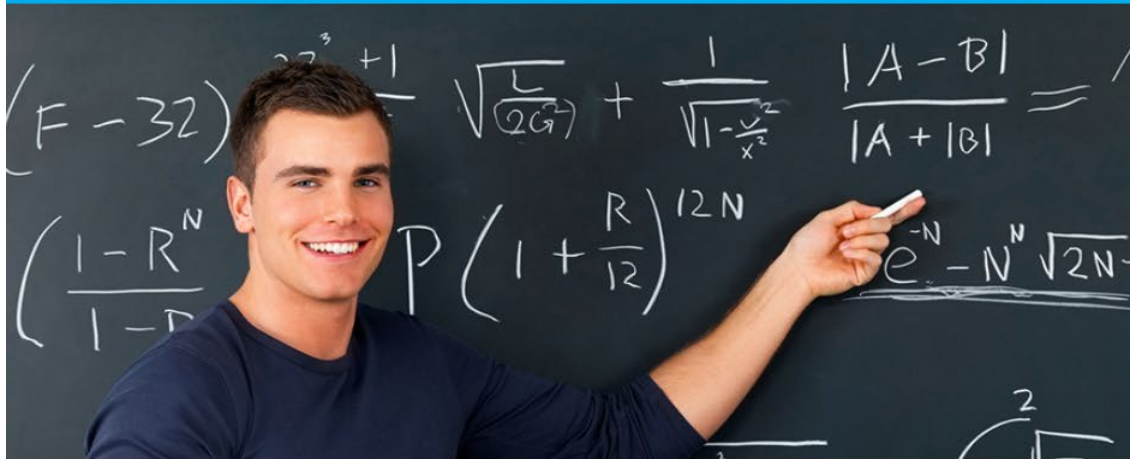
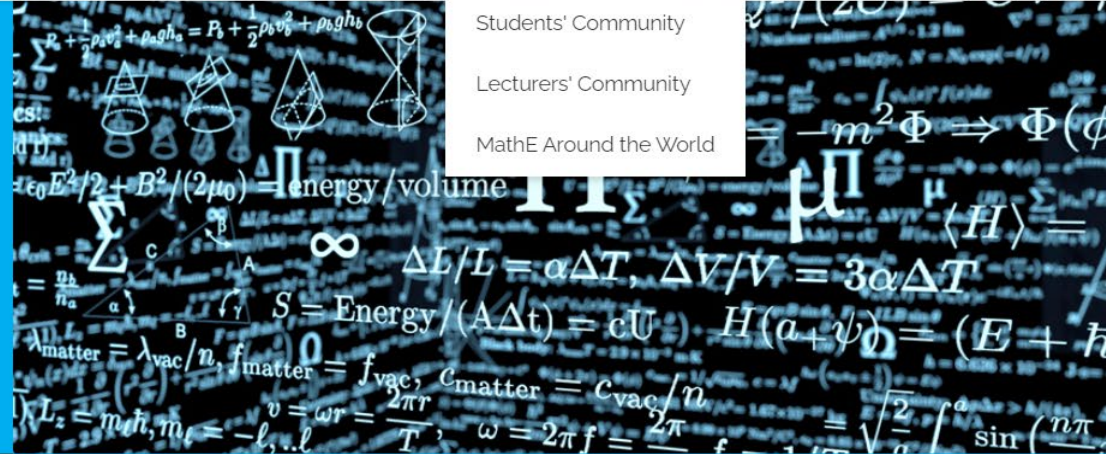
Home / Student's Assessment

This toolkit allows teachers to elaborate Final Assessments for their students on the topics they wish to evaluate. Students can apply when a Final Assessment is available for a course they attend. In order to see the list of the available final assessments, please log in.



VIDEO COLLECTION

A collection of reviewed video lessons on several Math topics.



VIDEO LESSONS

A collection of specifically created video lessons on selected Math topics.



MathE

https://mathe.pixel-online.org/index.php

Home Student's Assessment MathE Library Community of Practice Information

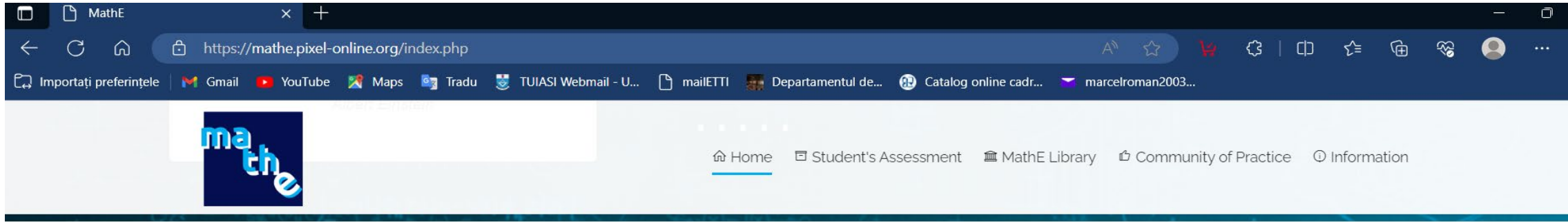
TEACHING MATERIAL

A collection of teaching and learning material to support students in the acquisition of competences on selected Math topics.

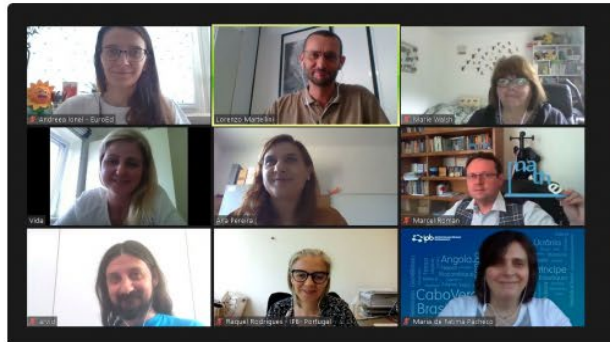
IF YOU CAN'T EXPLAIN IT SIMPLY, YOU DON'T UNDERSTAND IT WELL ENOUGH.

Albert Einstein

A virtual place to exchange teaching and learning experiences between teachers and students. Make sure that you are well prepared for the upcoming maths exam. Math Quiz preparation for exam is thorough and productive. Discover the MathE Community of Practice



LATEST NEWS



Sixth Partners' Meeting (Online)

The sixth meeting took place online on 23 June 2021. Ana Pereira from IPB (PT) and Lorenzo Martellini from Pixel (IT) presented to the partners the current situation for the intellectual outputs. The three of them are completed and available for



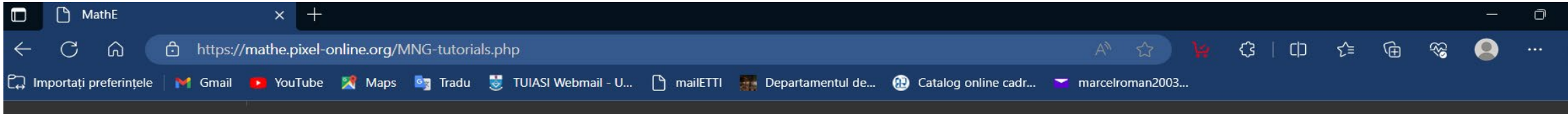
Students' Online Community

The online [Students' Community of Practice](#) is available on the project portal. The aim is to foster the exchange of experiences among math students registered on the platform and have a direct contact with the lecturers to receive guidance and suggestions.

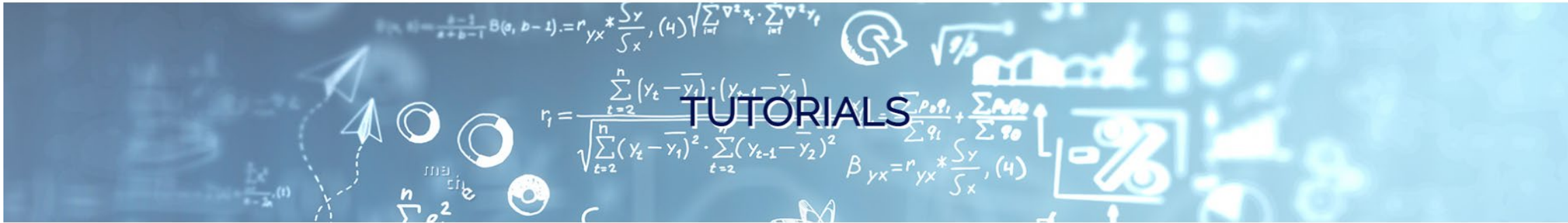


Lecturers' Community

The online Lecturers' Community of Practice is available on the project portal. The aim is to foster the exchange of teaching experiences among math teachers. All lecturers registered on the portal have the possibility to participate in the online discussions and share their ideas with the other colleagues.



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Tutorials for Lecturers



Video tutorial for lecturers on how to register



Home / MathE Library

Please select a math topic, subtopic and keyword to access the available video lessons.

Search By:

Topic:

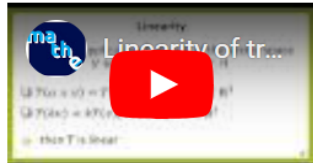
SubTopic:

Keywords

<input type="checkbox"/> Composition of linear applications	<input type="checkbox"/> Injective linear application	<input type="checkbox"/> Invertible linear operator
<input type="checkbox"/> Isomorphism	<input type="checkbox"/> Kernel	<input checked="" type="checkbox"/> Linear application
<input type="checkbox"/> Linearity	<input checked="" type="checkbox"/> Matrix of a linear transformation	<input checked="" type="checkbox"/> Range
<input type="checkbox"/> Rotation		



Kernel and Range of Linear Application
 Edite Cordeiro, Flora Silva, Paula Maria Barros
 In this video lesson we will specify the kernel and the range of a linear application and we present some examples.
 Languages: English
https://youtu.be/qG_YYJz11w



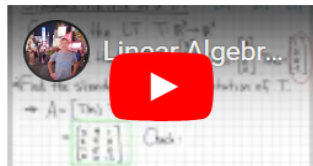
Linearity of transformations
 Edite Martins Cordeiro, Flora Silva, Paula Maria Barros
 With some examples, you will be able to understand the properties of linearity of applications.
 Languages: English
https://youtu.be/0u_EIsX1Ss



Representations of linear transformations
 Edite Martins Cordeiro, Flora Silva, Paula Maria Barros
 With some examples, you will be able to understand that linear transformations are represented by matrices, which depend on certain basis.
 Languages: English
https://youtu.be/_ODZRv-EKuE



Kernel and Range of Linear Transformations
 TheTrevTutor
 In this video, the author presents the concept of linear transformation, kernel and range. He solve an exercise where determine the span of the kernel and the range of a linear application.
 Languages: English
<https://www.youtube-nocookie.com/embed/r7ZsD95gcEE>



Linear Algebra Example Problems - Finding "A" of a Linear Transformation #2
 Adam Panagos
 In this video the author based on a linear transformation given by the image of the canonical basis elements of the starting space, determines the standard matrix and shows how to calculate the image of a given vector.
 Languages: English
<https://www.youtube-nocookie.com/embed/J2bjzpyW6ro>



Linear transformations
 3blue1brown, by Grant Sanderson



Welcome to MathE Student Forum

Students are invited to discuss in the forum issues and challenges on the topics of the MathE project

Can't Start Discussion

Latest ▾

↻

- All Discussions

Following

Tags

 - Analytic Geometry
 - Complex Numbers
 - Differential Equations
 - Differentiation
 - Fundamental Mathematics

A

How to be good at Mathematics

Ana I. Pereira started Dec '21

See <https://www.wikihow.com/Be-Good-at-Mathematics>

Suggestions

1

M

Summer Reading

↩ Konstantinos Paragioudakis replied Nov '21

It's that time of year! Has anyone got any good suggestions for books with mathematics as part of the storyline?

Suggestions

8

M

Suggest a discussion

↩ Maria de Fátima Pacheco replied Nov '21

Students who wish to discuss a topic not yet covered in the existing discussions are invited to propose it here.

Fundamental Mathematics

33

K

Questions and problems on theory of matrix and determinants

Linear Algebra

Matrices an

53



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https://mathe.pixel-online.org/files/MathE_Guidebook.pdf

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Desenare Citiți cu voce tare Întrebați inteligența artificială Bing 1 din 47

Community of Practices



Guidebook of Good Practices

MathE tools for INGENIUM students!

Marcel Roman

marcel-romica.roman@academic.tuiasi.ro

