Week: April 26 – May 2, 2021
Topic: **Potential fields**

The below provided instructions should guide you through studying the topic. For additional explanation, clarification and extra material contact the Lecture/Tutorial teacher by email or the MS-Teams platform for live online consultation (see webpage for the link).
https://mat.nipax.cz/mathematics:mathematics_ii

The goal for this week is to finish the topic of line integral. Besides of various standard applications of line integrals (of both kinds) we will focus on some specific vector fields in E_2. The line integral path independence for certain class of vector fields will be introduced together with the notion of potential (conservative) fields. The potentiality of vector fields will be studied namely in two dimensions, where the sufficient conditions can easily be formulated making use of, among others, the Green's theorem that we discussed last week. The case of three-dimensional potential vector fields will be left for the end of semester, when the surface integral will be explained.

1) Read and learn the explanation from the textbook. Scanned pages can be found on the web page.
https://mat.nipax.cz/_media/mathematics:pages_70-83.pdf
https://mat.nipax.cz/_media/mathematics:pages_104-118.pdf

Additional material and alternative explanation with many figures and exercises can be found in (free) online available textbooks
http://www.math.wisc.edu/~keisler/calc.html
namely chapter 13 http://www.math.wisc.edu/~keisler/chapter_13.pdf

https://openstax.org/books/calculus-volume-3/pages/1-introduction
namely chapter 6 https://openstax.org/books/calculus-volume-3/pages/6-introduction

2) Take a look at the solved exercises from our collection of examples
questions: https://mat.nipax.cz/_media/line_integral_1.pdf
complete solutions (in Czech): https://mat.nipax.cz/_media/krivkovy_integral_komplet.pdf

3) As a training solve (at least) the following exercises.
492, 494, 515 – applications of line integral
544, 565, 582 – Green's theorem and potential fields

4) As a long term homework, to be delivered at specified deadline, solve all the corresponding exercises from sample exams from our webpage
https://mat.nipax.cz/_media/mathematics:ma2_exam_1n_en.pdf
https://mat.nipax.cz/_media/mathematics:ma2_exam_2n_en.pdf
https://mat.nipax.cz/_media/mathematics:ma2_exam_3n_en.pdf

The delivery of all sample exams, completely and correctly solved (by yourself) is necessary (but not sufficient) condition for obtaining the assessment from tutorials.

DEADLINE: April 26, 2021 for the second part of the homework

(3rd and 4th exercise from Exam 1, Exam 2 and Exam 3, except exercise 3 from Exam 1A and exercise 3 from Exam 3A)