

Week: May 10 – May 16, 2021

Topic: **Applications and integral theorems**

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

In the first lecture we will review the possible applications of surface integrals (of both types) with focus on mechanics of fluids and solids. The theorems of Stokes and Gauss will be discussed in detail. The second lecture will focus on practical use of the integral theorems, including their role in studying potential and solenoidal fields. The differential operators div and curl will be revisited and redefined using the integral theorems.

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_84-103.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 6.7 - 6.8 <https://openstax.org/books/calculus-volume-3/pages/6-7-stokes-theorem>

<https://openstax.org/books/calculus-volume-3/pages/6-8-the-divergence-theorem>

2) Take a look at the solved exercises from our collection of examples

questions: https://mat.nipax.cz/media/surface_integral.pdf

complete solutions (in Czech): <https://mat.nipax.cz/media/19plosny-skalar.pdf>

https://mat.nipax.cz/media/plosny_integral_vektor_pole.pdf

https://mat.nipax.cz/media/veta_gauss_ostrogradsky.pdf

3) As a training solve (at least) the following exercises.

624, 628, 632 – applications of surface integral

682, 686, 699 – Gauss divergence theorem

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.