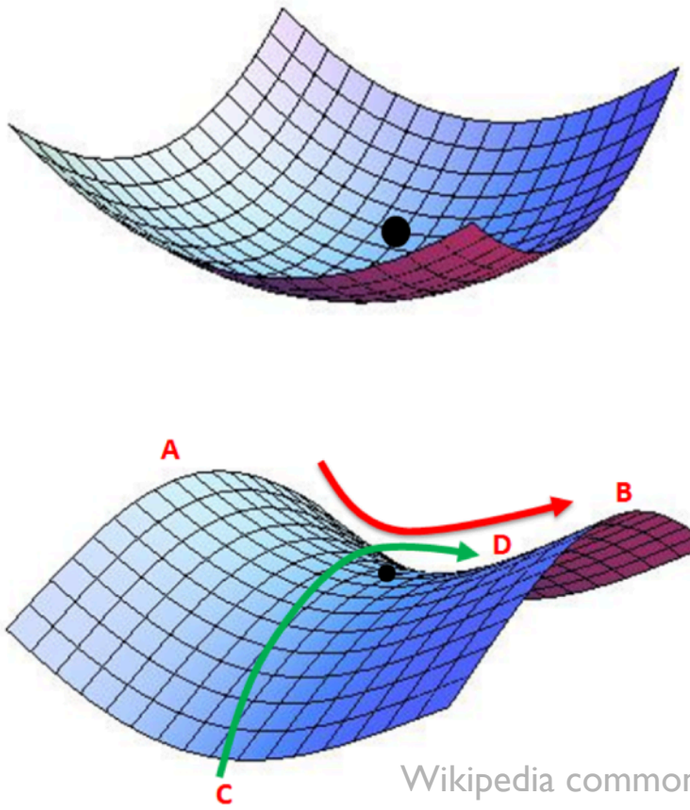
Week 7 - #2

Vector Analysis (II)



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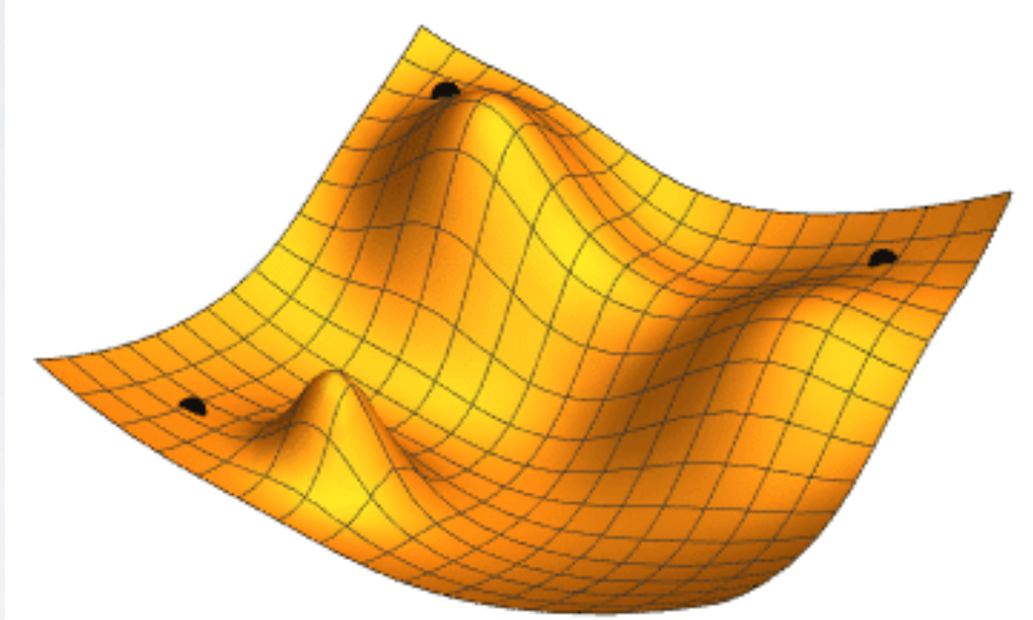


gradient descent, Wikipedia commons

Today: Ch 6

Next Class: Ch 10.5, 10.7-10.9

Ji-hoon Kim (Seoul National University)

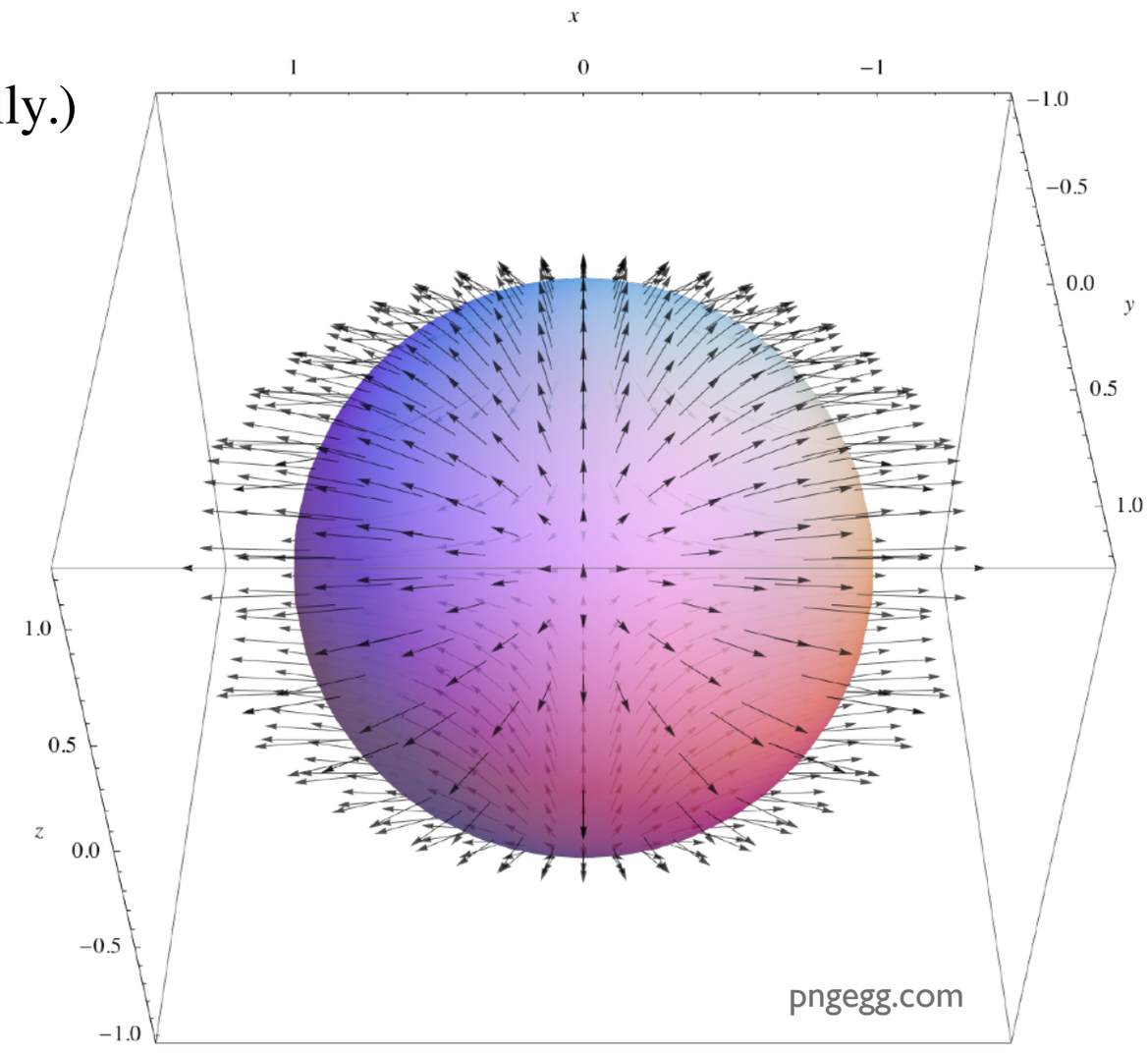
Rudimentary Mathematical Methods of Physics (Fall 2025): Quiz #10

— [open book and open note, but no cellphone or laptop, drop it off as you leave the class] —

Please write down your name and student ID in the top right corner. (0.0 pt: no paper found with your name / 0.5 pt: paper found with your name and some answers / 1.0 pt: good answers)

1. Explain, in layman's terms without detailed math or proofs, what the divergence theorem means. You may use a figure like the one below. Refer to your textbook for inspirations.

2. Boas, Chapter 6, Section 10, Problem 3
(Read the instruction at the top of the page carefully.)



Rudimentary Mathematical Methods of Physics (Fall 2025): Suggested Problems in Chapter 6, Boas, 3rd ed.

The problems I suggest you to take a deeper look into include, but are not limited to, the following. The class homework assignments will mainly be from this list.

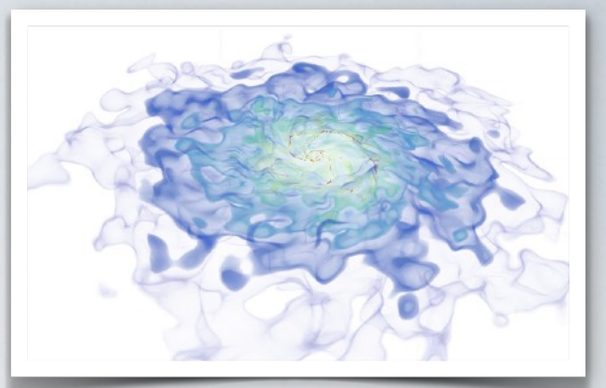
- Section 03: Problems 12, 13, 14, 16, 17
- Section 04: Problems 6, 9
- Section 06: Problems 8, 13, 14, 16
- Section 07: Problems 6, 7, 15, 16, 17
- Section 08: Problems 6, 14, 18, 19, 20
- Section 09: Problems 3, 4, 7, 8
- Section 10: Problems 6, 10, 12, 15, 16
- Section 11: Problems 8, 10, 12, 16, 17(b)(d)(e), 18
- Section 12: Problems 3, 16, 19

<u>Chapter 10, Sections 5 & 7-9</u>

- Section 05: Problems 5, 7, 10
- Section 08: Problems 6
- Section 09: Problems 2, 5

39 problems / 173 total

(Ch.10) 13 problems / 138 total



No Class next Wednesday (Oct. 22)

Midterm Examination: October 25

- Oct. 25 (Sat), 19:30-21:00 pm
- 56-105 (student ID ending with odd number) or 106 (even number)
- Covers everything discussed in the class before the exam including Boas Chapters 1-6 and parts of Chapter 10.

msutoday.msu.edu

Mathematical Physics I (Fall 2025): Midterm Examination

Oct. 25, 2025

[total 20 pts, closed book/cellphone, no calculator, 90 minutes]

• First, make sure you have all 6 answer sheets. Write down your name and student ID on each of all 6 answer sheets. Then, number the sheets from (1) to (6) on the top right corner. Your answer to each problem must *only* be in the sheet with the matching number (e.g., your answer to Problem 2 must *only* be in sheet (2)). After the exam, you will separately turn in all 6 answer sheets, even if some sheets are still blank.

• Make sure you have all 6 problems. Have a quick look through them all and portion your time wisely. If you find any issue or question, you *must* raise it in the first 30 minutes. You have to stay in the room for that 30 minutes even if you have nothing to write down.

• Make your writing easy to read. Illegible answers will *not* be graded.

Midterm: On The Day of the Exam (I)

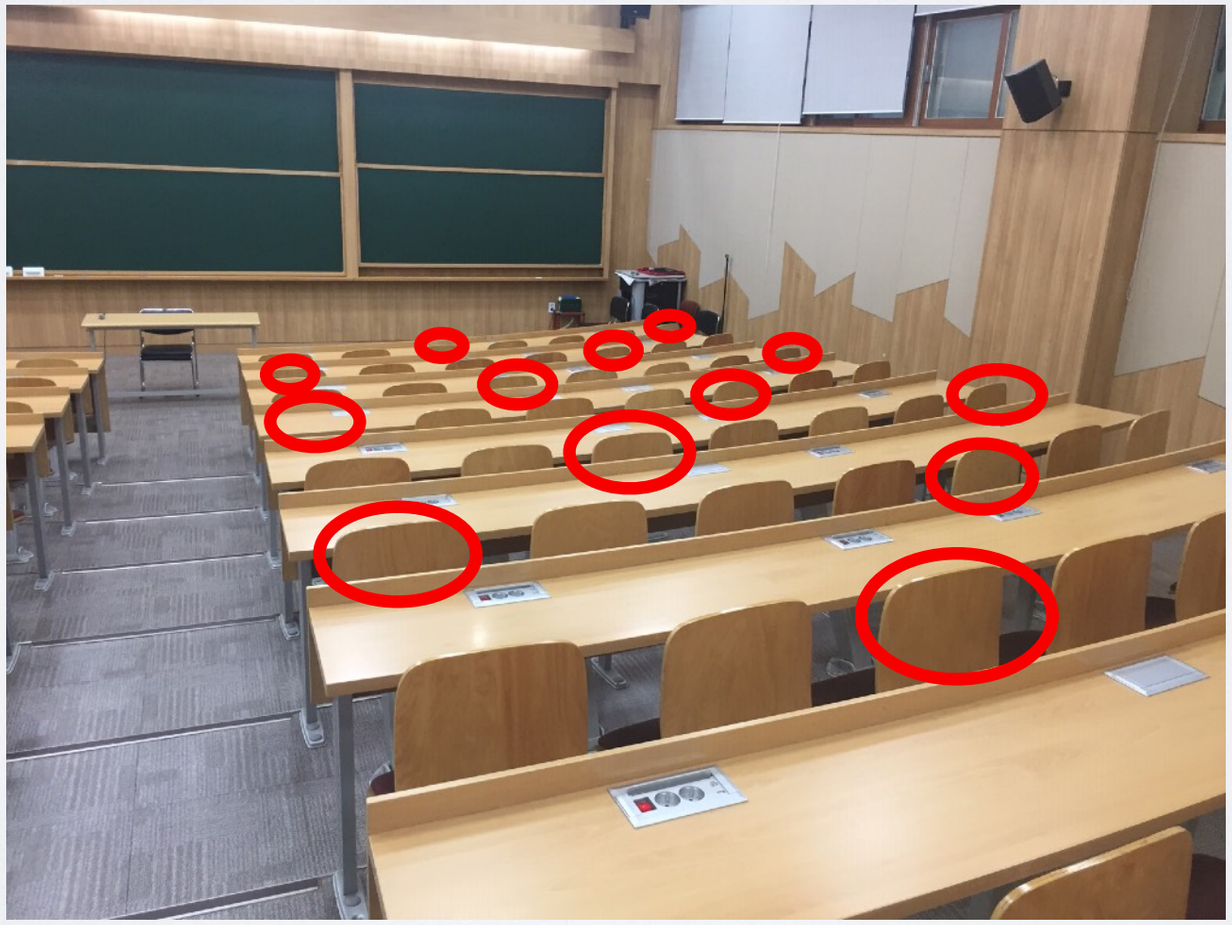
- Arrive by no later than 19:15pm. One of the first floor doors to Bldg 56 will be propped open between 19:00-19:30pm.

- If you have a fever or a cough, or have had any symptoms, you must report to the professor in advance so that we can arrange something else for you.

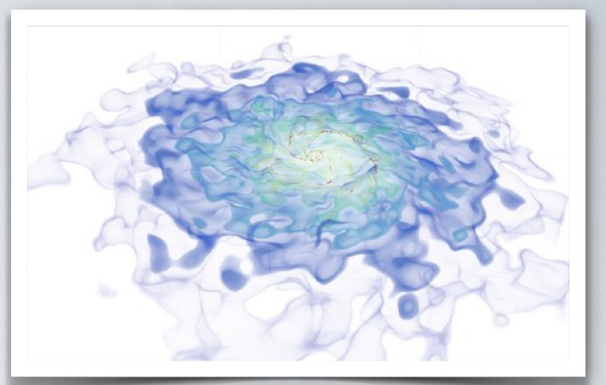
Midterm: On The Day of the Exam (II)

- Make sure to sit far enough from one another to allow enough personal space.

- If any issue with any of the questions, please let the TAs know in the first 30 minutes. You may leave the room after 30 minutes.



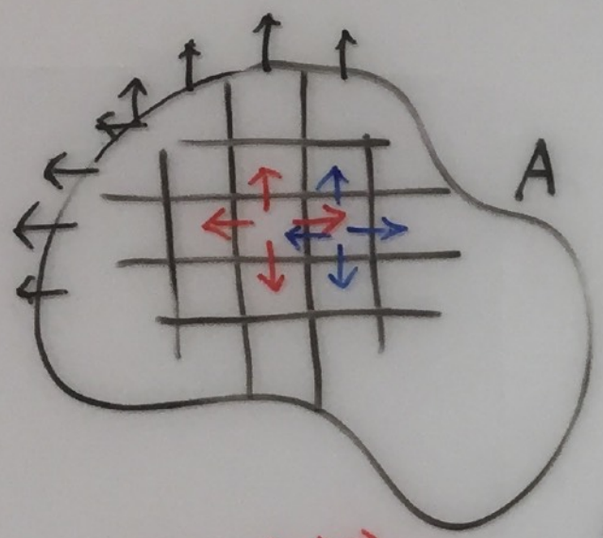
Seats in 56-105/106



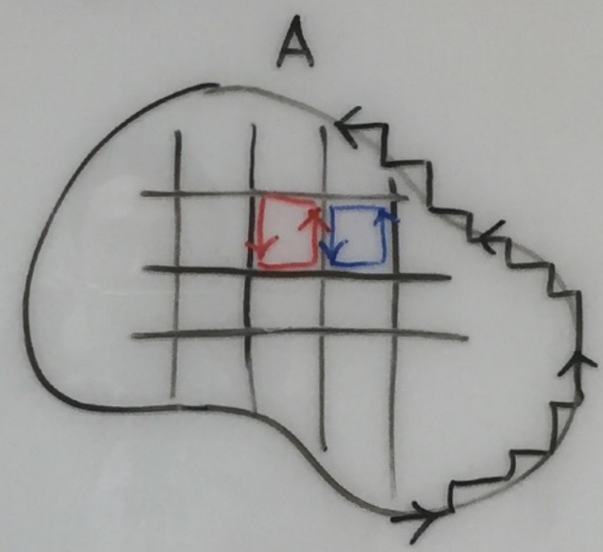
Gauss' Thm and Stokes' Thm

Gauss's Thm and Stokes' Thm

Chapter 6. Vector Analysis



$$\sum_i \vec{\nabla}\cdot\vec{V}\,d\sigma_i = \int_{\partial A} \vec{V}\cdot\hat{n}\,ds$$



$$\sum_i (\vec{\nabla}\times\vec{V})\cdot\hat{n}\,d\sigma_i = \int_{\partial A} \vec{V}\cdot d\vec{r}$$