

# Calculus 2 IBDPE Midterm 2 Info

## Time and Location

Friday, June 5, 09:10-10:00 at D.A.E. 5825 (for Odd student ID number) and D.A.E. 5828 (for Even student IP number).

## Ground Rules

- Closed book. No notes. No calculator. The only allowed items on your desk are pen/pencil, erasers/whiteout, and ruler. No food is allowed. Coffee or beverage is allowed, although discouraged.
- Please use the bathroom before the exam. If you absolutely have to go to bathroom during the exam, you need to go to the designated ones that we have inspected before the exam. You also need to verify to me that your pockets are empty before you go.
- No hat nor sunglasses may be worn unless required by medical condition.
- ABSOLUTELY no electronic device may be turned on during the exam. Any voice from cellular phone is considered cheating.
- Makeup exam is only possible when a student is absent due to university official duties.
- Regrade: please see the syllabus for regrade policy.

## Tools

Only writing tools are allowed during this exam.

## Format

There will be six equally weighted problems. You will choose four problems to answer and indicate which four problems to be graded. Problems not indicated for grading will be ignored.

## **Topics to Cover**

This exam covers materials from the first lecture after the first midterm to Homework 12. Specifically,

- Taylor Series: Be able to derive, and manipulate Taylor polynomials around any origin. Be able to determine the interval and radius of convergence of a power series and any problems related to that. You will again be required to derive the Taylor polynomials of the four basic functions:  $e^x$ ,  $\sin x$ ,  $\cos x$ , and  $\ln x$ , around the origin.
- Vector in  $\mathbb{R}^3$ : Be able to thoroughly understand vectors in  $\mathbb{R}^2$  or  $\mathbb{R}^3$  as well as their relevant operations such as dot product or cross product.
- Plane Geometry: Know how to derive equations of lines and planes in all forms introduced in class.
- Vector Calculus: know the precise definition of parametrized curves in  $\mathbb{R}^2$ , or  $\mathbb{R}^3$ , know their calculus and related properties, know how to parametrize a curve differently, know how to compute associated vectors associated with a curve such as unit normal, unit tangent, and osculating planes. Know how to compute arc lengths of curves and be able to parametrize a curve by its arclength.
- Conic Sections and Quadric Surfaces: Know and be able to reproduce all conic sections and quadric surfaces introduced in class. Variables might be switched and you need to be careful with that. Know how to determine the level set of a given equation, and also be able to determine whether a trace is arisen from the graph of some function.
- Functions of Several Variables: Know how to compute, as well as its geometric and analytic meanings, of partial derivatives. Know how to show that limit of a function does not exist. You are NOT required to show the existence of the limit. Know how to compute and understand the meanings of gradients and directional derivatives.

Materials before the first midterm will not be explicitly tested but might be necessary for the topics listed above.

### **Study Suggestions**

- Get enough sleep the night before the exam.
- Practice homework problems THOROUGHLY and be able to appreciate the insight of the problems so that you can do those problems in any forms and with moderate variations. Exam problems are modelled on homework problems.
- This exam emphasizes on conceptual understanding rather than mechanical computations. If you are stuck in long computations, it is recommended to rethink your process and see if you are forgetting some part of the concepts.