Introduction to Advanced Mathematics - Fall 2019
高等数学概要5（英）

Week #	Date	Topics	教学大纲-教学内容
4	9/10	Introduction to calculus [Preview of Calculus]; Review of precalculus knowledge [Chapter 1]	函数的概念，函数的性质，基本初等函数的性质及图形，复合函数及反函数的概念
5	9/17	The limit of a sequence [§11.1]; The limit of a function [§2.2, 2.4]	数列极限的定义与性质，函数极限的定义与性质，函数的左右极限
5	9/20	Calculating limits using the limit laws [§2.3]; Two important limits [Zhou §1.3, Stewart pg. 192]	极限的四则运算法则，极限存在的准则（破敛准则和单调有界准则），两个重要极限
6	9/24	Infinity and infinitesimal [Tongji 1.5]; Comparison of infinitesimal [Tongji 1.7]	无穷大与无穷小的概念，无穷小的比较
6	9/27	Continuity [§2.5]	函数连续的定义，间断点，初等函数的连续性，闭区间上连续函数的性质（最大最小值定理，零点定理和介值定理）
7	9/29	Functions and limits review	函数与极限复习课
8	10/8	Derivatives and Rates of Change [§2.7]; The derivate as a function [§2.8]	导数的概念与几何意义，函数的连续性与可导性的关系；高阶导数的概念
8	10/11	Derivative of polynomials and exponential functions [§3.1]; The product and quotient rules of derivative [§3.2]	函数的四则运算的求导法则
9	10/15	Derivatives of trigonometric functions [§3.3]; The chain rule [§3.4]	复合函数的求导法则
9	10/18	Implicit differentiation [§3.5]; Derivatives of logarithmic functions [§3.6]	反函数的导数，隐函数和参数函数的求导法则
10	10/22	The mean value theorem [§4.2]; The differential formula of elementary functions [Tongji 2.5]	微分的概念；微分中值定理：罗尔定理，拉格朗日定理
10	10/25	Differentiation review	导数习题课
11	10/29	**Midterm (in class)**	期中考试
11	11/1	Intermediate forms and l'Hospital's Rule [§4.4]	洛必达法则

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12	11/5	Taylor series [§11.10]	泰勒公式
	11/8	Maximum and minimum values [§4.1]; How derivatives affect the shape of a graph [§4.3]	函数极值的概念及其求法，用导数判定函数的单调性，用导数判定函数曲线的凹凸性与拐点
13	11/12	Summary of curve sketching [§4.5]; Optimization problems [§4.7]	函数作图，简单的最大值最小值应用问题；曲率及曲率半径（简单提一下）
	11/15	Applications of differentiation review; Antiderivatives [§4.9]	导数的应用习题课，原函数的概念
14	11/19	Areas and distances [§5.1], The definite integral [§5.2]	定积分的概念与性质
	11/22	The fundamental theorem of calculus [§5.3]	微积分基本公式
15	11/26	Indefinite integrals and the net change theorem [§5.4]	不定积分的概念与性质
	11/29	The substitution rule [§5.5]	定积分和不定积分的换元法
16	12/3	Integration by parts [§7.1]	定积分和不定积分的分部积分法
	12/6	Integration review and problem session	积分习题课（换元法与分部积分法）
17	12/10	Other techniques of integration (selected) [§7.2, 7.3, 7.4 7.5]	三角函数有理式的积分，有理函数的积分，简单无理函数的积分
	12/13	Approximate integration [§7.7]; Improper integrals [§7.8]	反常积分及其收敛性的概念
18	12/17	Areas between curves [§6.1], Volumns [§6.2, 6.3]	定积分的几何应用（面积、旋转体体积、平行截面面积为已知的立体的体积）
	12/20	Work [§6.4]; Arc length [§8.1]	定积分的物理应用（功、水压力、引力）；定积分的几何应用（弧长）
19	12/24	Integration and its applications review	积分及应用习题课
	12/27	Final exam review	期末考试复习

Textbook: *Calculus*, 7th Edition, James Stewart，高等教育出版社，影印版，上册。

Main references: 文科高等数学基础教程，第三版，周明儒，高等教育出版社.

Cong Liang, 09/15/2019, TJU