LECTURE SUMMARY 1.1

1. Administrative issue, Syllabus, Course outline

1. Basic introduction to myself and this course, lecture time/office hour/tutorial time/TA's office hour;

2. Syllabus and Course Outline has been uploaded on Blackboard.

3. Quizzes, Assignments, Problem sets, term test, final test.

4. Marking scheme.

5. No make-up term test/quizzes, 20%/day punishment on late submission of assignments.

6. Assignment 1 & Quiz 1 time.

7. all above information could be found in Syllabus and Course outline. We will use Blackboard to post all the materials as well as grades.

2. Limit, Differentiation, Integration

1. continuous function.

2. relationships between differentiation and integration, examples.

3. Fundamental Theorem of Calculus.

4. Obligation1: Remember/Recite all the formulas in Section 5.1 Theorem 2 (Page 340), i.e., basic integration formulas. Ask TA or come to my office hour if you need any help in understanding the table of integration.

5. Obligation2: Remember/Recite basic formulas for differentiation.

6. Obligation3: Know how to draw graphs of $e^x, \ln x, \sin x, \cos x, \tan x, \cot x, \sec x, \csc x, ax + b, ax^2 + bx + c, x^3$.

3. Fundamental Theorem of Calculus (FTC)

Theorem 3.1 (Part I). *Let f be continuous and $F(x) = \int_a^x f(t)dt$, then $F'(x) = f(x)$.*

Theorem 3.2 (Part II). *Suppose $F'(x) = f(x)$, and f is continuous, then $\int_a^b f(x)dx = \int_a^b F'(x)dx = (F + C)|_a^b = F(b) - F(a)$, where C is any constant.*

Ex1. $(\int_0^x e^t \sin t dt)' = e^x \sin x$.

Ex2. $\int e^x - x \, dx$.

Ex3. Population of bacteria. $P'(t) = 100e^{-3t}$, $P(1) = 500$, what is $P(0), P(2)$?

4. Substitution

1. Recall Chain Rule.

2. Derive formula of substitution via FTC and Chain Rule.

3. Examples, $\int \tan x \, dx$, $\int (x^2 + 1)^2 * 2x \, dx$.

4. Key 1: 1). Find g', then derive g; 2). Find f'(g), derive f; 3). Use substitution.

5. Key 2. The purpose of using substitution is to get rid of those terms that is so complicated and

that you do not want, denote them g.

5. Integration by Parts

1. Recall Product Rule.
2. Derive formula of Integration by Parts via FTC and Product Rule.
3. Examples, $\int x \sin x dx$, $\int x e^x dx$, $\int \ln x dx$, $\int x \ln x dx$.
4. Key: Calculate easier integration to derive harder integration.