LECTURE SUMMARY 1.2

1. Review and constant "C"

1. Review what we have learned last lecture.
2. For the constant "C", after each integration, any algebraic operation of "C" could be replaced by a new "C".

2. Riemann Sum

1. Summation Notation.
e.g. $\sum_{i=1}^{n} f(x_i)\Delta x = f(x_1)\Delta x + f(x_2)\Delta x + f(x_3)\Delta x + ... + f(x_n)\Delta x$.
e.g. $2 + 2^2 + 2^3 + ... + 2^6 = \sum_{i=1}^{6} 2^i$
2. Approximation of integral by Riemann Sum, $\int_a^b f(x)\ dx = \lim_{n\to\infty} \sum_{i=1}^{n} f(x_i)\Delta x$. Here we call $R_n := \sum_{i=1}^{n} f(x_i)\Delta x$ the Riemann sum, $\Delta x = \frac{b-a}{n}$ is the length of each subintervals, and x_i is any point in the i-th interval, we call it sample point. Usually, we take x_i to be the left endpoint, right endpoint, or midpoint of each subinterval.
3. examples.

3. Simpson's Rule

1.Simpson's approximation of $\int_a^b f(x)\ dx$ using n subintervals is

$$S_n = \frac{\Delta x}{3}[f(x_0) + 4f(x_1) + 2f(x_2) + 4f(x_3) + 2f(x_4) + ... + 4f(x_{n-3}) + 2f(x_{n-2}) + 4f(x_{n-1}) + f(x_n)]$$

where n is always even, $\Delta x = \frac{b-a}{n}$, $x_i = a + i\Delta x$.
2. examples.