

LECTURE SUMMARY 2.1

WEDNESDAY, MAY 11, 2016

1. DEFINITE INTEGRAL & INDEFINITE INTEGRAL

1. Difference.
2. Relationship.

2. FORMULAS OF INTEGRATION BY PARTS AND SUBSTITUTION

1. Integration by parts.

$$\int f(x) \cdot g'(x) dx = f(x) \cdot g(x) - \int f'(x) \cdot g(x) dx$$
$$\int_a^b f(x) \cdot g'(x) dx = f(x) \cdot g(x) \Big|_a^b - \int_a^b f'(x) \cdot g(x) dx$$

2. Substitution.

$$\int f'(g(x))g'(x)dx = f(g(x)) + C$$

$$\int_a^b f'(g(x))g'(x)dx = (f(g(x)) + C) \Big|_a^b = (f(g(b)) + C) - (f(g(a)) + C) = f(g(b)) - f(g(a)) = f(g(x)) \Big|_a^b$$

3. FORMULA IN TERMS OF "U" "V" FOR INTEGRATION BY PARTS

1. Change of variable formula. $u = g(x)$ implies $du = g'(x)dx$.
2. Formulas.

$$\int v du = vu - \int u dv$$
$$\int_a^b v du = vu \Big|_a^b - \int_a^b u dv$$

3. examples.

4. FORMULA USING CHANGE OF VARIABLE FOR SUBSTITUTION

1. Key: Change expressions of x to u , then integrate as functions of u , (which is simpler than integration of x .) at last change expressions of u back to terms of x .
2. examples.

5. TRIGONOMETRIC SUBSTITUTION

1. Example.
2. Not required.

6. IMPROPER INTEGRAL(SECT. 8.8)

1. Improper integral Type I.
2. Improper integral Type II.
3. Examples.