

31 Lecture - MTH101

Important Subjective

What is the basic principle of substitution in evaluating definite integrals?

Answer: The basic principle of substitution in evaluating definite integrals is to replace the variable of integration with a new variable that is simpler to integrate, then evaluate the integral in terms of the new variable, and finally replace the new variable with the original variable.

What is the purpose of substitution in definite integration?

Answer: The purpose of substitution in definite integration is to simplify the integrand so that it can be more easily integrated.

What are the steps involved in evaluating definite integrals using substitution?

Answer: The steps involved in evaluating definite integrals using substitution are as follows:

Substitute the expression for the new variable in terms of the old variable.

Differentiate the expression for the new variable to find the differential element, and substitute it into the integral.

Simplify the integrand in terms of the new variable.

Evaluate the integral in terms of the new variable.

Substitute the original variable back into the expression to obtain the final answer.

What is the general formula for evaluating definite integrals by substitution?

Answer: The general formula for evaluating definite integrals by substitution is as follows:

$$\int [f(g(x)) * g'(x)] dx = \int f(u) du, \text{ where } u = g(x).$$

Can any integral be evaluated using substitution?

Answer: No, not all integrals can be evaluated using substitution. Some integrals require other techniques such as integration by parts or partial fractions.

What is the importance of selecting the appropriate substitution variable?

Answer: Selecting the appropriate substitution variable is important because it simplifies the integrand and makes the integration process easier. Choosing an inappropriate substitution variable can make the integral more difficult or impossible to evaluate.

What are the common substitution formulas used in definite integration?

Answer: The common substitution formulas used in definite integration are trigonometric substitutions, u-substitutions, and exponential substitutions.

What is the difference between indefinite and definite integration using substitution?

Answer: Indefinite integration using substitution involves finding the antiderivative of a function using a substitution technique, while definite integration using substitution involves finding the exact numerical value of a definite integral using a substitution technique.

Can substitution be used to evaluate integrals with more than one variable?

Answer: No, substitution can only be used to evaluate integrals with a single variable.

Can substitution be used to evaluate improper integrals?

Answer: Yes, substitution can be used to evaluate some types of improper integrals. However, it is important to ensure that the limits of integration are appropriate for the given function.