

30 Lecture - MTH101

Important Subjective

What is the First Fundamental Theorem of Calculus?

Answer: The First Fundamental Theorem of Calculus establishes a connection between integration and differentiation. It states that if $f(x)$ is a continuous function on an interval $[a, b]$, then the definite integral of $f(x)$ from a to x is differentiable on the interval (a, b) , and its derivative is $f(x)$ evaluated at x .

What is the significance of the First Fundamental Theorem of Calculus?

Answer: The theorem provides a powerful tool for solving problems that involve finding the area under a curve. It allows us to calculate the derivative of the definite integral of a function, which in turn enables us to find the slope of a tangent line to a curve at any point.

What does the derivative of the definite integral of a function represent?

Answer: The derivative of the definite integral of a function represents the slope of the tangent line to the curve at any point.

What is the formula for the First Fundamental Theorem of Calculus?

Answer: If $f(x)$ is a continuous function on $[a, b]$, then the function $g(x)$ defined by $g(x) = \int_a^x f(t) dt$ is differentiable on (a, b) , and $g'(x) = f(x)$ for all x in (a, b) .

What is the relationship between integration and differentiation according to the First Fundamental Theorem of Calculus?

Answer: The First Fundamental Theorem of Calculus establishes a relationship between integration and differentiation. It states that the derivative of the definite integral of a function is equal to the original function.

What is the role of the limit concept in the proof of the First Fundamental Theorem of Calculus?

Answer: The proof of the theorem is based on the definition of the definite integral as a limit of Riemann sums. It involves showing that as the number of subintervals in the Riemann sum increases, the sum approaches the definite integral of the function.

What is the application of the First Fundamental Theorem of Calculus in physics?

Answer: The theorem can be used to calculate the total distance traveled by an object whose velocity is given by a function. The definite integral of the velocity function over a given time interval gives the total displacement of the object over that interval, while the derivative of the definite integral gives the instantaneous velocity at any point in time.

What is the application of the First Fundamental Theorem of Calculus in economics?

Answer: The theorem can be used to calculate the present value of future cash flows. It allows us to calculate the integral of the cash flows over a given period, and the derivative of the integral gives the present value of the cash flows at any point in time.

Is the First Fundamental Theorem of Calculus applicable only to continuous functions?

Answer: Yes, the theorem is applicable only to continuous functions.

What is the difference between the First and Second Fundamental Theorem of Calculus?

Answer: The First Fundamental Theorem of Calculus establishes a connection between integration and differentiation, while the Second Fundamental Theorem of Calculus establishes a connection between definite integrals and indefinite integrals. The Second Fundamental Theorem states that if $f(x)$ is a continuous function on an interval $[a, b]$, then the definite integral of $f(x)$ from a to b is equal to the difference between the antiderivative of $f(x)$ evaluated at b and the antiderivative of $f(x)$ evaluated at a .