

15 Lecture - MTH101

Important Subjective

What is the definition of the derivative?

Answer: The derivative of a function is a measure of how much the function changes when the input is changed by a small amount. It is defined as the limit of the ratio of the change in the output to the change in the input, as the change in the input approaches zero.

What does the derivative represent?

Answer: The derivative represents the rate at which the function is changing with respect to the input variable x . It can also be interpreted as the instantaneous rate of change of the function at a specific point.

How do you calculate the derivative of a function?

Answer: To calculate the derivative of a function, we use a process called differentiation. There are several rules of differentiation that can be used to calculate the derivative of a function, including the power rule, the product rule, the quotient rule, and the chain rule.

What is the power rule?

Answer: The power rule is used to find the derivative of a function that is a power of x . The rule states that if $f(x) = x^n$, then $f'(x) = nx^{(n-1)}$.

What is the product rule?

Answer: The product rule is used to find the derivative of a function that is the product of two functions. The rule states that if $f(x) = g(x)h(x)$, then $f'(x) = g'(x)h(x) + g(x)h'(x)$.

What is the quotient rule?

Answer: The quotient rule is used to find the derivative of a function that is the quotient of two functions. The rule states that if $f(x) = g(x)/h(x)$, then $f'(x) = [g'(x)h(x) - g(x)h'(x)] / h(x)^2$.

What is the chain rule?

Answer: The chain rule is used to find the derivative of a composite function. The rule states that if $f(x) = g(h(x))$, then $f'(x) = g'(h(x))h'(x)$.

What are the applications of the derivative?

Answer: The derivative has many applications in calculus. It is used to find the maximum and minimum values of a function, as well as the points where the function is increasing or decreasing. It is also used to find the inflection points of a function, which are points where the concavity of the function changes.

How is the derivative used in physics and engineering?

Answer: The derivative can be used to find the velocity of an object at a specific point in time or the rate of change of a chemical reaction. It is also used to find the slope of a tangent line to a curve, which is useful in physics, engineering, and other fields where rates of change are important.

What is the relationship between differentiation and integration?

Answer: Integration is the inverse of differentiation and is used to find the total change of a function over a given interval. The derivative and the integral are closely related, and understanding one is essential for understanding the other.