

What is Integration ?

Aim

To introduce the concept of integration.

Learning Outcomes

At the end of this section you will:

- Understand what is meant by integration,
- Have identified some applications of integration within business,
- Understand what is meant by the term “the constant of integration”.

We have previously looked at the process of differentiation. This involves finding the derivative of a function with respect to the variable. In this section we will study the process of finding the equation of a function when given the derived function. This process, which is the reverse of differentiation, is called **integration**. The process of integration is sometimes referred to as finding the antiderivative of the specified function.

The function to be integrated is called the **integrand**. When a function has been integrated the result is referred to as the **integral**.

Integration has many applications within business. It enables you to recover an expression for the total revenue function from any given marginal revenue function, to recover the total cost function from any given marginal cost function and so on. It also enables you to calculate the producer’s and consumer’s surpluses from the supply and demand curves.

The Constant of Integration

If $y = 4x^2$ then we know that $\frac{dy}{dx} = 8x$. But if $y = 4x^2 + 6$ then $\frac{dy}{dx} = 8x$ also, or if $y = 4x^2 - 3$ then again $\frac{dy}{dx} = 8x$.

Thus $8x \, dx$ is the derivative of any function of the form $y = 4x^2 + c$, where c is a constant.

$$\Rightarrow \int 8x \, dx = 4x^2 + c$$

where c is an unknown constant called the *constant of integration* and \int is the symbol for integration.

Related Reading

Jacques, I. 1999. *Mathematics for Economics and Business*. 3rd Edition. Prentice Hall.

Morris, O.D., P. Cooke. 1992. *Text & Tests 5*. The Celtic Press.