

Applications of integral calculus

Environment, Nature



To find the moment of inertia, you find the area under, and also between the curve(s). An application in which integration is key to reaching the target value is a PAID Controller. The purpose of a PAID Controller is to determine the error between what is measured and what is expected. The "I" or integration part of the controller is the collected past errors. The actual integral is the total of the instantaneous error over time. All parts of the error are included, meaning duration and amount. Integral mathematics has much to do with the duration and amount of something.

One major example is population analysis. Population analysis is a form of Integral math that is applied for biology. The births in the present year rely on many things from previous years, most obviously the amount of births in the previous year. All things affect the population of the proceeding years. Since all variables intertwine with one another, they can be put into one common integral equation. Two major variables in the equation would be the rates of fertility and survivorship. The average temperature for weather also uses integration.

For example, the weatherman would note the average temperature for his time last year to show how much weather has fluctuated. How did he get an average temperature? He found it using integration. The weatherman would make a graph of the weather of math from this time last year, and create an integral to find the exact average value. He could then wait until he has collected enough information for this season this year and find the average temperature of this season through integration. With these two average values, he could compare the two for changes.

When cars were first created, not much about them was efficient whatsoever. They may have delivered the driver from point A to point B more quickly than before cars, but like most new inventions, cars were greatly flawed. To fix these errors, manufacturers began crash testing for safety, which involves physics. Using integration, a crash test analyst can first find average results for crashes with safety products as well as results without safety products. Then, with the separate averages he can compare the results to verify that the specific safety products are realistic to install into vehicles.

Specifically, the severity index, which was aimed towards being able to determine the risk of an injury to the head, is calculated by using an integral. Severity Index is the Integral from zero to T of EDT. In the severity index integral, T represents the duration of the deceleration during the crash test and $a(t)$ is the deceleration at time (t). Though the Severity Index was a good calculation, something better was discovered. The Head Injury Criterion is based on the average value of acceleration over the most important part of the deceleration.

The new and Improved Integral Tutorial Tort ten nana Injury criterion represents ten maximum alee over the critical time period for the integral expression. This method is much more realistic and is used to test things such as the safety of an airbag and even prove that stables do in-fact save lives. Integration is also used for finding displacement from velocity, and velocity from acceleration. Unlike a lot of other applications, in this situation you would use the indefinite integral for displacement and velocity. An

integral is used to define these two things because integration is the opposite of differentiation.

Consequently, to find displacement you would use the indefinite integral of velocity (v) EDT. Likewise, you would determine velocity by using the indefinite integral of acceleration (a) EDT. Integrals are also involved in biology. One integral is the Coulomb Field approximation. With this approximation, one calculates the Borne radius. Although it is acceptable, the Coulomb Field approximation is known to overestimate the Borne radii. Other methods of the Coulomb Field approximation have been demonstrated by adding and subtracting certain areas of the equation. Using integration you can also find the average off moving sequence of numbers.

This is commonly done with stocks. The numbers that "move" in the stock integral would be the day and the price. Along with integration being involved in the stock business, it is also involved in consumer surplus and producer surplus. Producer's surplus is the surplus money that the producer obtains from charging less than the selling price. Consumer's surplus is the difference between what consumers are willing to pay and what they do actually end up spending. Similar to the integrals dealing with extra money in consumerism and production, you can use integration to find the three different values of a continuous income stream.