1. Many aspects of civil engineering require calculus. Firstly, derivation of the basic fluid mechanics equations requires calculus. For example, all hydraulic analysis programs, which aid in the design of storm drain and open channel systems, use calculus numerical methods to obtain the results. In hydrology, volume is calculated as the area under the curve of a plot of flow versus time and is accomplished using calculus.
2. 3. ϒ In structural engineering, calculus is used to determine the forces in complex configurations of structural elements. ϒ Structural analysis relating to seismic design requires calculus. ϒ In a soil structure context, calculations of bearing capacity and shear strength of soil are done using calculus, as is the determination of lateral earth pressure and slope stability in complex situations.
3. 4. ϒ In mechanical engineering, calculus is used for computing the surface area of complex objects to determine frictional forces, designing a pump according to flow rate and head, and calculating the power provided by a battery system. Newton's law of cooling is a governing differential equation in HVAC design that requires integration to solve.
4. 5. ϒ Analysis of rockets that function in stages require calculus, as does gravitational modeling over time and space. Almost all physics models, especially those of astronomy and complex systems, use some form of calculus.
5. 6. ϒ In business, Calculus can help us by providing an accurate and measurable way to record changes in variables using numbers and mathematics. ϒ Derivatives in calculus can be used to determine maximum profit, minimum cost, rate of change of cost, and how to maximize/ minimize profit, cost or production ϒ Functions are used to illustrate the relationship between two or more variables. ϒ In economics, calculus can be used when working on concepts like margins. ϒ Calculus is used by economists when they are looking to determine the most opportune time to buy or sell goods or when considering the affects of price on how much consumers purchase.
6. 7. ϒ By using the principles of calculus, we can find how fast a tumor is shrinking/growing, the size when the tumor will stop growing and when certain treatments should be given and finding the volume of a tumor. ϒ Calculus can be used to determine the blood flow in an artery or a vein at a given point in time. ϒ Calculus can be used to find the amount of blood pumped through the heart per unit time. ϒ In biology, it is utilized to formulate rates such as birth and death rates. ϒ Calculus is used to find out the rate of change of the surface area for a rapidly growing adolescent.

From Gary Hollis, works at University of South Carolina

Answered Dec 11, 2014 · Upvoted by David Joyce, Professor of Mathematics and Computer Science at Clark University