

# Applications of density in the multivariable setting essay sample

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Applications of density in the multivariable setting Density of a substance can be defined as mass of the substance per unit volume. It can be expressed as  $\text{kg/m}^3$  and  $\text{g/cm}^3$  among others (Manolis, 2009). Density can be applied in various multivariable settings namely science, statistics and Engineering among many others. Application of Density in Science (Physics and Mathematics) Density shows the relationship existing between the mass and the volume of a given object. According to Physics, the difference in densities of an object allows it to float or sink depending on the level of its density. Various scientific industries namely beverage, chemical, pharmaceutical, and oil industries apply the density in their operations. Nevertheless, in Physics density is used to make various science devices which are actually important in carrying out research on various objects. For instance, most of these industries use a device referred to as density meter which allows them to measure the density of various components. Taking an example in Beverage industries the density of an alcohol is measured in order to find the alcohol concentration in the given beverage (Manolis, 2009). Moreover, in physics density is an important tool in identifying specific gravity of various gases. It does so by determining the ratio of the density of the given gas to that of air considering temperature and pressure prevailing at that moment. In so doing, the physicists are able to deduce various gravities for given gases. On the other hand, in Mathematics density helps Mathematicians to determine various densities of Solids used in the subject. In so doing mathematics teachers are able to use real examples to explain density concepts to their students. Finally, the idea of density in Physics

helps the teachers to illustrate and explain to their students the reason as to why some objects sink and others float on different fluids. For instance, an object with a density of  $2\text{g/cm}^3$  would sink in water since its density exceeds that of water while else an object with a density of  $0.5\text{g/cm}^3$  would float in water since its density is lower than that of water. Application of Density in Engineering Density is much is very crucial in the engineering design sector of the economy. First, density in Engineering is quite important in the pipe designing. This is to imply that density assists engineers very much when dealing with the piping system more so when forcing a fluid to pass through the pipes. For the fluid to move an engineer requires a pump which actually uses the idea of density in its functioning. Nevertheless, an engineer is required to have enough knowledge on the viscosity of the fluid and its density in order to come up with the right pump for the job. Therefore, the denser the fluids, the more the force an engineer require applying on it (Manolis, 2009). In addition, engineers to know need much about density when designing other engineering appliances and systems. In production, engineers need to know densities of various fluids and even air. This will allow them to make sound decisions when designing various systems. On the other hand, density also is a factor for engineers when they need to construct or build something where weight and its distribution are important. Finally, engineers incorporate density in the analysis of the way engineering materials interact in fluid mechanics. For instance, in analyzing the charge in a stored battery the idea of density is very important. When a battery discharges electricity, the acid in it mixes with the lead in the battery thus forming a new chemical I (Manolis, 2009). As a result, it decreases the

density of the solution this calls for the engineers to measure the density in order to determine the level of the remaining charge. Application in Statistics (Actuarial Science) Density in Statistics is a parameter used to make various data which are used for statistical analysis. Various density functions are used in order to analyze the data efficiently. Its application is directly linked with parametric and non-parametric which are widely used in performing financial analysis in Actuarial science. It incorporates various distributions. To make the estimations the density function makes use of the mean and standard deviation (Kolman & Trench, 1971). Actuarial science makes use of distribution densities in analysis the functioning of insurance companies. This is in determining the distribution of the complexity of insurance policies and also diversification of risks. Through this one is able to analyze insurance data using the distribution densities thus able to know the level of the company's risks and complexity of its policies. Nevertheless actuarial science uses the densities in the insurance company to forecast future occurrence of business risks. Furthermore, in actuarial science distribution density is used to estimate various economies of countries. This is done by calculating and analyzing of the funding and investment strategies prevailing in a given economy. In so doing, the country is able to use the distribution density data to forecast and improve its future economy. Finally, actuarial science is able to incorporate various distribution densities in analyzing the chance of re-offending in criminal justice. The idea is to use probability densities to estimate the risks associated with different sex offenses. Finally, there are more other applications of distribution densities in actuarial science this are

in health science, pension industry, and social welfare programs(Kolman& Trench, 1971).

## **References**

Kolman, B., & Trench, W. F. (1971). Elementary multi variable calculus. New York: Academic Press.

Manolis, K. (2009). Density. Minneapolis, MN: Bellwether Media.