Number Types

An **integer** is any whole number, negative or positive. For example, 56 or -56 is an integer.

A **rational number** is one that can be expressed in the form $\frac{p}{q}$ where p and q are both integers and $q \neq 0$. For example, -4 is a rational number since it can be expressed as $\frac{-4}{1}$. Another rational number could be 9.5 which can be expressed as $\frac{19}{2}$. An **irrational number** is one that can not be expressed in the above form. Probably the most cited irrational numbers are π and $\sqrt{2}$.

$\Re$ stands for the space of real numbers. A **real number** can be absolutely any number that is not a complex number. Thus a real can be a decimal or a whole number, an irrational or a rational number; negative or positive. In linear algebra there is extensive use of vectors in different $\Re-$dimensions.

A **vector** is simply a list of numbers. Sometimes they are called column vectors which captures more precisely their appearance. They have an m$\times$1 dimension; this means that the vectors are of m rows (m can be any positive integer) but only one column. A vector in $\Re^2$ (read as "R-two") is a 2$\times$1 matrix such as $\mathbf{v} = \begin{bmatrix} 3 \\ 4 \end{bmatrix}$. The exponent in $\Re$ indicates the number of rows in the vector. $\Re^7$ is a vector with 7 rows.

A **complex number** is an expression that is made up of a "real" element and an "imaginary" element. Some example of complex numbers are $1 + i$ or $-2 + i\sqrt{3}$. The first part is the "real" element and the second part is the "imaginary" element whereby i is multiplied by a real. "i" stands for imaginary ($i = \sqrt{-1}$). The space of complex numbers is denoted by $\mathbb{C}$.