Numbers, arithmetic and basic algebra

math612.0 A1: From numbers through algebra to calculus and linear algebra

Gunnar Stefansson (editor) with contributions from very many students

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Natural Numbers

The positive integers are called natural numbers.

These numbers can be added, multiplied together and so forth.

Notation: $\mathbb{N} = \{1, 2, 3, 4, ...\}$

Subtraction and division are not defined on these numbers.

An arbitrary element of $\mathbb{N}$ is most commonly denoted by i, j, n,or m, but any symbol can be used.

Starting with R

Download R from the R website: http://www.r-project.org/
Look at on-line information on R, and take the tutor-web R tutorial: http://tutor-web.net/stats/stats240.1
Simple R commands:

- Assignment: `x<-2`
- Arithmetic: 2*5+4

Simple R commands:

- Assignment: `x<-2`
- Assignment: `y<-3`
- Arithmetic ending in assignment: `z<-x+y`

View the results of x+y by simply typing "z". It is also possible to use '=' for assignment, but this is **NOT** equivalent. There are other uses for the equal sign making it quite confusing and it is therefore not recommended for use as an assignment operator.

The Integers

The set of positive and negative integers:
$\mathbb{Z} = \{.., .., -2, -1, 0, 1, 2, ...\}$

Rational numbers

Rational numbers are fractions denoted p/q, where p and q are integers. We can simplify fractions if the numerator and denominator contain common terms.

Examples of rational numbers. Note that every integer is a rational number. The set of all rational numbers is usually denoted $\mathbb{Q}$.

The real line

Some obvious numbers are not fractions.
The set of numbers making up the real line is denoted by the symbol $\mathbb{R}$.

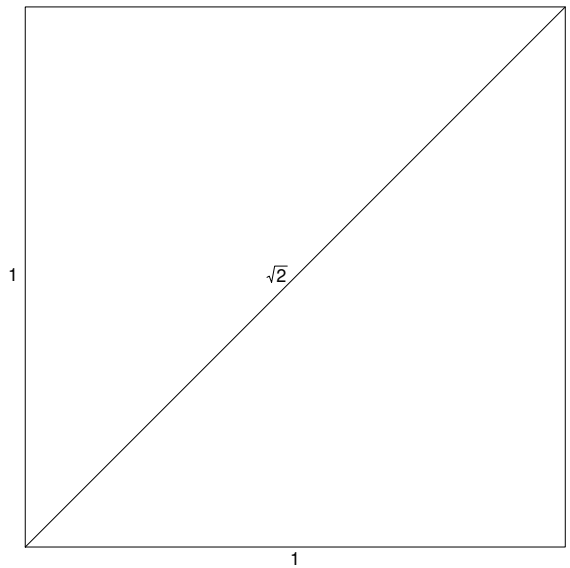

Figure: The diagonal of a rectangle with unit side lengths of $\sqrt{2}$, Note that $\sqrt{2}$ ia not a fraction.

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