Numbers, arithmetic and basic algebra

math612.1 612.1 Numbers, arithmetic and algebra

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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:

```
> x<-2
> y<-3
> z<-x+y
```

View the results of x+y by simply typing "z".

```
> z
[1] 5
```

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 $\mathbb{R}$.

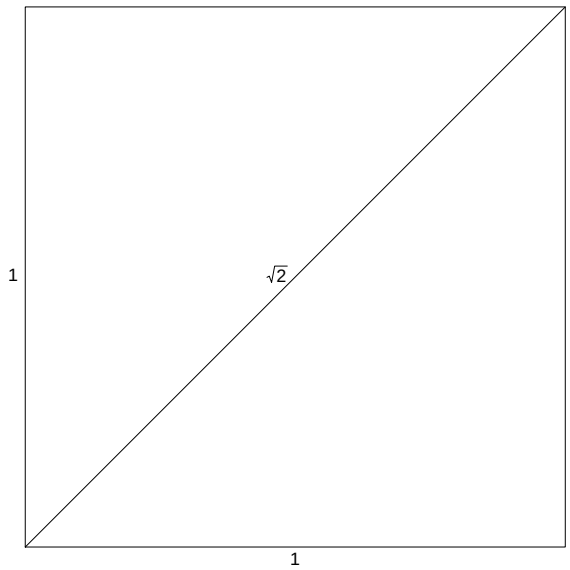

Figure : The diagonal of a rectangle with unit side lengths of $\sqrt{2}$, Note that $\sqrt{2}$ ia not a fraction.