Comment (for the particularly interested)

Mathematics is *axiomatically* founded. This means we declare[1] some propositions to be true, and these are called *axioms* or *postulates*. For the subject of calculations we have 12 axioms[2], but in this book we have confined ourselves to explicitly mention the following 6:

Aksiom

For the numbers a, b and c we have

$$a + (b + c) = (a + b) + c \tag{A1}$$

$$a + b = b + a \tag{A2}$$

$$a(bc) = (ab)c \tag{A3}$$

$$ab = ba \tag{A4}$$

$$a(b + c) = ab + ac \tag{A5}$$

$$a \cdot \frac{1}{a} = 1 \qquad (a \neq 0) \tag{A6}$$

(A1)	Associative law for addition
(A2)	Kommutativ law for addition
(A3)	Associative law for multiplication
(A4)	Commutative law for multiplication
(A5)	Distributive law
(A6)	Existence of a multiplicative identitity

By applying axioms, we can derive more complex contexts which we call *theorems*. In this book we chose to let *rules* be the collective name for definitions, theorems and axioms. This is because alle three, in practice, draws up guidelines (rules) inside the mathematical system in which we wish to operate.

[1] Preferably, as few as possible.

[2] The number can slightly vary, depending on how the axioms are expressed.

In *Part* **??** we have tried to present the *motivation* behind the axioms, because (obviously) they are not randomly selected. The train of thoughts that leads us to the them is the following:

1. Vi define positive numbers as representations of either an amount or a placement on a number line.
2. We define what addition, subtraction, multiplication and division entail for positive integers (and 0).
3. From the marks above, it's as good as self-evident that (A1) - (A6) is valid for all positive integers.
4. We define also fractions as representations of either an amount or a placement on a number line. What the elementary operations entail for fractions rests upon what is valid for the positive integers.
5. From the remarks above, we conclude that (A1) - (A6) is valid for all rational numbers.
6. We introduce negative numbers and an extended interpretation of addition and subtraction. This in turn leads to the interpretations of multiplication and division involving negative numbers.
7. (A1) - (A6) is still valid after the introduction of negative integers. Deriving that they are also valid for negative rational numbers is a formality (omitted in the book).
8. We can never write the value of an irrational number exact, but it can be approximated by a rational number[1]. Therefore, all calculations involving irrational umbers is, in practice, calculations involving rational numbers, and in this way we can conclude that[2] (A1) - (A6) is also valid for irrational numbers.

A similar train of thoughts can be applied concerning the power-rules found in *Seksjon* **??**.

[1]For example, we can write $\sqrt{2} = 1.414213562373... \approx \frac{1414213562373}{1000000000000}$

[2]*Attention!* This explanation is good enough for the aim of this book but is an rather extreme simplification. Irrational numbers is a very complex subject, in fact, many books presenting advanced mathematics utilize several chapters to cover the subject in full depth .