

Math 240 Algebra I, DROR BAR-NATAN.

Read Along. Appendices A-D of text.

Riddle Along. 3 logicians walk into a bar.

Barman: Do you all want beer?

Logician 1: I don't know

Logician 2: I don't know

Logician 3: I know.

Q: What did he know? How many wanted beer?

Today's menu: 1. What is this class about?
2. About this class?
3. Start to work!

on
board.

3 The real numbers: a set \mathbb{R} with two binary ops
+ & \times and two special elements 0 & 1 s.t.

R1 $a+b=b+a$ $ab=ba$

R2 ASSOC.

R4 negatives & inverses

R3 0, 1

R5 Distributivity.

don't
line

Much of algebra, though not all, follows:

Follows: $(a+b)(a-b) = a^2 - b^2$

Doesn't follow: $\forall a \exists x$ s.t. $a = x^2$ or $a = -x^2$

A Field: $(F, +, \times, 0 \neq 1)$ s.t.

Examples 1. The reals \mathbb{R} .

F1 Commutativity:

2. The rationals \mathbb{Q}

F2 Associativity:

3. The complex numbers $\mathbb{C} = \{a + b\sqrt{-1}\}$

F3 Units

4. $0, 1$ with $\begin{array}{r} +10/1 \\ 0/0/0 \\ |1/0 \end{array}$ $\begin{array}{r} 0/0/1 \\ 0/0/0 \\ |1/0/1 \end{array}$

F4 Inverses

5. $0, 1, 2, 3, 4, 5, 6$ with a funny def. of
+, \times .

F5 Distributivity