Mathematics

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- Precalculus - Mathematics for Calculus by James Stewart

- Calculus by James Stewart

Part I

Precalculus

Chapter 1

Algebra

1.1   Real Number Systems

Natural Numbers $\mathbb{N} = \{1, 2, 3, \dots\}$

Whole Numbers $\mathbb{W} = \{0, 1, 2, 3, \dots\}$

Integers $\mathbb{Z} = \{0, \pm 1, \pm 2, \pm 3, \dots\}$

Rational Numbers $\mathbb{Q} = \left\{\frac{a}{b} : a, b \in \mathbb{Z},\ b \neq 0\right\}$

Irrational Numbers $\mathbb{I} = \mathbb{R} \setminus \mathbb{Q}$

Real Numbers $\mathbb{R} = \mathbb{Q} \cup \mathbb{I}$

$\qquad \mathbb{N} \subset \mathbb{W} \subset \mathbb{Z} \subset \mathbb{Q} \subset \mathbb{R}$

1.2   Properties of Real Numbers

1.2.1   Commutative Property

addition $a + b = b + a$

multiplication $ab = ba$

1.2.2   Associative Property

addition $(a + b) + c = a + (b + c)$

multiplication $(ab)c = a(bc)$

1.2.3   Distributive Property

distributive $a(b + c) = ab + ac$

distributive $(b + c)a = ba + ca$

1.3   Set Notation

set of elements {}

such that | or :

is an element of $\in$

is not an element of $\notin$

is a subset of $\subseteq$

is a proper subset of $\subset$

is a superset of $\supseteq$

is a proper superset of $\supset$

empty set $\emptyset$

universal set U

cardinality $|A|$

1.4   Equality/Inequality Notation

less than $<$

greater than $>$

less than or equal to $\leq$

greater than or equal to $\geq$

equal to $=$

not equal to $\neq$

approximately equal to $\approx$

1.5   Set Operations

union $\cup$

intersection $\cap$

difference $\setminus$

complement A'

1.6 Logical Notation

for all $\forall$

there exists $\exists$

there does not exist $\nexists$

implies $\implies$

if and only if $\iff$

equivalent to $\equiv$

not equivalent to $\not\equiv$