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we define the intersection of two sets u and v and write $u \cap v$ as the set whose elements are characterized by $x \in u \cap v$ if and only if $x \in u$ and $x \in v$ for example $\{1, 2\} \cap \{2, 1\}$ the meaning of $\cap$ is the usual one in everyday language if p and q are sentences then p and q means that both p and q are true o knill 2010 2021 lecture 7 set theory and logic 7 1 sets are fundamental building blocks of mathematics while logic gives a language and rules for doing mathematics set theory provides the material for building mathematical structures set theory is not the only possible framework in a similar manner there are several ways to create new sets from sets that have already been defined in fact we will form these new sets using the logical operators of conjunction and disjunction or and negation not for example if the universal set is the set of natural numbers $\mathbb{N}$ and set theory is the branch of mathematical logic that studies sets which can be informally described as collections of objects although objects of any kind can be collected into a set set theory as a branch of mathematics is mostly concerned with those that are relevant to mathematics as a whole sets and logic this chapter introduces sets in it we study the structure on subsets of a set operations on subsets the relations of inclusion and equality on sets and the close connection with propositional logic if $a \subseteq b$ and $b \subseteq a$ we can form the ordered pair (a, b) the fundamental property of ordered pairs is that $(a, b) = (c, d)$ if and only if $a = c$ and $b = d$ if a and b are sets the set $\{a, b\}$ is the set of all elements x such that $x = a$ or $x = b$ 4 1 basic notions of set theory page id joseph fields southern connecticut state university in modern mathematics there is an area called category theory 1 which studies the relationships between different areas of mathematics set theory studies sets the fundamental building blocks of mathematics while logic describes the language of all mathematics set theory provides the framework for additional structures in cantor's set theory one can compute with subsets of a given set x like with numbers this textbook covers a comprehensive list of topics in a typical undergraduate advanced mathematics curriculum topics include logic set theory functions relations and mathematical induction proof techniques form a foundation for mathematical reasoning suitable for all introductory mathematics undergraduates notes on logic and set theory covers the basic concepts of logic first order logic consistency and the completeness theorem before introducing the reader to the fundamentals of axiomatic set theory through in depth coverage of logic sets and relations learning to reason offers a meaningful integrated view of modern mathematics cuts through confusing terms and ideas and provides a much needed bridge to advanced work in mathematics as well as computer science original inspiring and designed for maximum comprehension this remarkable book overview authors peter j cameron peter cameron is a well known mathematician with an excellent reputation both as a teacher and as a researcher the book proposal has had very good reviews and should sell well even though it is a high level text because of cameron's reputation in the field equivalence into relationship between sets by replacing $\cap$ with $\cup$ and with proof let x be an arbitrary object the stated condition holds since 7 left side replace set ops with propositional logic apply propositional logic equivalence replace propositional logic with set ops 7 chapter 1 the foundations logic sets and functions section 1 1 logic note in this section we introduce elementary symbolic logic we define propositions and put truth values on propositions definition a proposition is a statement that is either true or false but not both sets logic computation is an introductory textbook on metalogic it covers naive set theory first order logic sequent calculus and natural deduction the completeness compactness and löwenheim skolem theorems turing machines and the undecidability of the halting problem and of first order logic logic proofs and sets logic proofs and sets jwr tuesday august 29 2000 1 logic a statement of form if p then q means that q is true whenever p is true the converse of this statement is the related statement if q then p a statement and its converse do not have the same meaning for example the statement if $x \geq 2$ then $x^2 \geq 4$ is true logic set theory and mathematical induction play essential roles in modern mathematics and computer science this book is intended to fill the gap between rigorous advanced mathematical logic texts and discrete mathematics texts that do not treat logic with the depth required in modern computer science it is clear that set theory is closely related to logic the intersection and union of sets can be defined in terms of the logical and and logical or operators the notation $x \in p$ makes

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in a similar manner there are several ways to create new sets from sets that have already been defined in fact we will form these new sets using the logical operators of conjunction and disjunction or and negation not for example if the universal set is the set of natural numbers $\mathbb{N}$ and

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set theory is the branch of mathematical logic that studies sets which can be informally described as collections of objects although objects of any kind can be collected into a set set theory as a branch of mathematics is mostly concerned with those that are relevant to mathematics as a whole

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sets and logic this chapter introduces sets in it we study the structure on subsets of a set operations on subsets the relations of inclusion and equality on sets and the close connection with propositional logic

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if $a \in u$ and $b \in u$ we can form the ordered pair (a, b) the fundamental property of ordered pairs is that $(a_1, b_1) = (a_2, b_2)$ if and only if $a_1 = a_2$ and $b_1 = b_2$ if a and b are sets the set $\{(a, b) \mid a \in A, b \in B\}$

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set theory studies sets the fundamental building blocks of mathematics while logic describes the language of all mathematics set theory provides the framework for additional structures in cantor's set theory one can compute with subsets of a given set x like with numbers

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equivalence into relationship between sets by replacing with with and with proof let x be an arbitrary object the stated bi condition holds since $\rightarrow$ left side replace set ops with propositional logic apply propositional logic equivalence replace propositional logic with set ops $\rightarrow$

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logic set theory and mathematical induction play essential roles in modern mathematics and computer science this book is intended to fill the gap between rigorous advanced mathematical logic texts and discrete mathematics texts that do not treat logic with the depth required in modern computer science

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it is clear that set theory is closely related to logic the intersection and union of sets can be defined in terms of the logical and and logical or operators the notation $x \in p$ makes it possible to use predicates to specify sets

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