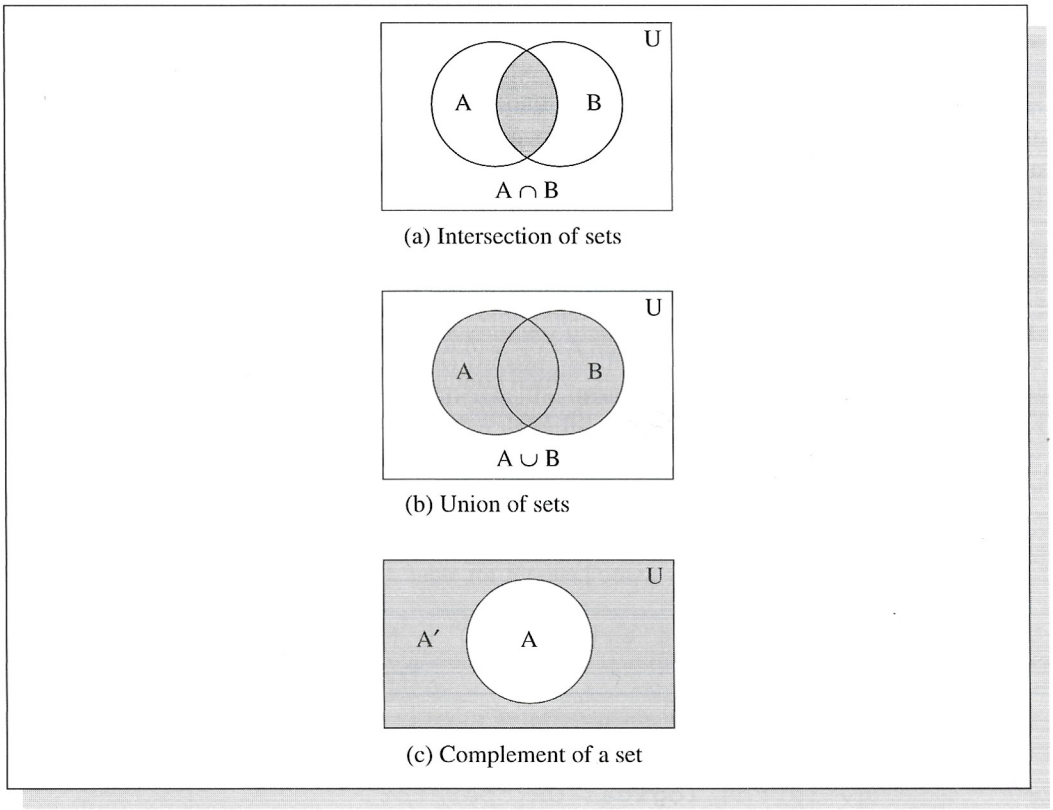
Figure 2.15 Venn Diagrams of Basic Set Operations



statement, "The President is always right because he is never wrong," has the appearance of reasoning due to the "because" that connects the two parts of the sentence. In fact, an assertion of this type is called a **tautology** because unlike a fact which may or may not be true in the real world, a tautology is always true in a purely logical sense because it refers to itself for proof. It states, "X is X." However if you are not of the same political party as the President, you may disagree based on the semantics rather than the form of the statement, and prefer the tautology, "The President is always wrong because he is never right."

Although the term *formal logic* may sound intimidating, it is no more difficult than algebra. In fact, algebra is really a formal logic of numbers. For example, suppose you were asked to solve the following problem: A school has 25 computers with a total of 60 memory chips. Some of the computers have two memory chips while others have four. How many computers of each type are there? The solution can be written algebraically as follows:

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25 = X + Y
60 = 2X + 4Y
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which can easily be solved for X = 20 and Y = 5.