

An argument is a set of propositions—things that can be asserted or denied—that is given to rationally convince someone of something. It uses a series of supporting statements, or premises, to attempt to lead someone logically to a certain conclusion. For example, if I were trying to convince someone that my roommate is allergic to peanuts, I would provide reasons for which they should believe that that is the case.

In order for my argument to be effective deductively, it must first be valid. An argument is valid iff it cannot have a false conclusion if the premises are true. We can test for validity by examining an argument's structure. Content, in fact, is irrelevant. A way to check for valid structure is to look for counterexamples: situations where the premises are true, but the conclusion is nonetheless false. Any time a counterexample exists, an argument is invalid. Continuing with the example about my roommate's peanut allergy, I might say, "If my roommate is allergic to peanuts, then she will be hospitalized. She is hospitalized. Therefore, she is allergic to peanuts." However, a counterexample exists for this argument, making it invalid. Even in the scenario that my roommate would be hospitalized if she were allergic to peanuts and she actually is hospitalized, she does not necessarily have a peanut allergy. She may be hospitalized due to falling down the stairs, instead. From my argument, it is impossible to know if my roommate is allergic to peanuts. When an argument is invalid, we do not know anything about how true or false the conclusion is; we simply know that the argument presented does not either prove, or disprove, the conclusion.

However, an argument is sound iff it is valid and its premises are true. Essentially, the argument must be structured so that the conclusion must be true if the premises are true, and the premises are, indeed, true. We can test for soundness by examining those two requirements. Clearly, if an argument is invalid, then it is unsound and nothing can be said of its conclusion. If it is valid, then the premises must be evaluated for truthfulness. My earlier argument, in addition to being invalid, has untrue premises since it is not the case that if she were allergic she would automatically be hospitalized (premise 1) and she is, in fact, not hospitalized (premise 2). Thus, my argument is unsound.

However, in the case that an argument has both validity and true premises, making it a sound argument, then its conclusion is necessarily true. Such would be the case had I argued, "If my roommate is allergic to peanuts, then she will have an adverse reaction to eating peanuts. She does not have an adverse reaction to eating peanuts. Therefore, she is not allergic to peanuts." This is an argument in modus tollens form, a common valid structure. Both premises are true, as well. This argument is sound, and my roommate is necessarily not allergic to peanuts.