

Argument Handout

Definitions

- (D1) An argument is a sequence of sentences (statements). The last sentence of the argument is the conclusion. The other sentences are the premises.
- (D2) An argument is **valid** if, and only if (iff), it is impossible for its premises to be true while its conclusion is false.
equivalently
- (D2') An argument is **valid** if, and only if, if the argument's premises are true, then its conclusion is true.
- (D3) An argument is **sound** if, and only if,
(a.) It is valid, AND
(b.) All of its premises are true.

Common Valid Argument Forms

Modus Ponens

1. If P, then Q
2. P
3. Therefore, Q

Disjunctive Syllogism

1. P or Q
2. not-Q
3. Therefore, P

Modus Tollens

1. If P, then Q
2. not-Q
3. Therefore, not-P

Hypothetical Syllogism

1. If P, then Q
2. If Q, then R
3. Therefore, if P, then R

Dilemma

1. P or Q
2. If P, then R
3. If Q, then S
4. Therefore, R or S

Multiple Modus Ponens

1. P
2. If P, then Q
3. If Q, then R
4. Therefore, R

Reductio Ad Absurdum

1. Assume not-P (for reductio)
2. If not-P, then Q and not-Q
3. Q and not-Q (!)
4. Therefore, P

Complex Arguments

1. If P, then Q
2. P
3. Therefore, Q
4. S or not-Q
5. Therefore, S

(Invalid Arguments)

From the definitions on the first page, we can see that a good way to show that an argument is invalid, is to come up with some possible story where the premises of the argument turn out to be true, but the conclusion turns out to be false.

Example One: Denying The Antecedent

1. If Julia ate an apple for lunch, then Julia ate a piece of fruit for lunch.
2. Julia didn't eat an apple for lunch.
3. Therefore, Julia did not eat a piece of fruit for lunch.

This argument is invalid. Consider the following possible scenario. Apples are fruits. So of course premise (1) is true. If Julia ate an apple, she ate a piece of fruit. However, suppose that Julia doesn't eat an apple for lunch, but eats a peach instead. Premise (2) is true, but our conclusion is false. She still ate a piece of fruit.

Example Two: Affirming The Consequent

1. If John rode in a Chevy to school, then John rode in an automobile to school
2. John rode in an automobile to school
3. Therefore, John rode in a Chevy to school.

This argument is invalid. Suppose John rode in a Ford to school. Premise (2) would be true. He rode in an automobile. Of course (1) is true. But the conclusion is false.

Invalid Arguments in Valid Arguments' Clothing

Looking at valid and invalid arguments and trying to determine which is which can be frustrating the first time you try. Part of the reason is that some common invalid arguments look a lot like some common valid arguments

Denying The Antecedent (Invalid)

1. If P, then Q
2. not-P
3. Therefore, not-Q

Modus Tollens (Valid)

4. If P, then Q
5. not-Q
6. Therefore, not-P

Affirming The Consequent (Invalid)

7. If P, then Q
8. Q
9. Therefore, P

Modus Ponens (Valid)

4. If P, then Q
5. P
6. Therefore, Q