

## Soundness and validity

**Argument form:** An argument form is the logical structure of an argument.

A particular argument that has a given argument form is called an *instance* of that form.

**Validity:** An argument form is valid if, and only if, every instance has either a false premise or a true conclusion. An argument is valid if, and only if, it is an instance of a valid argument form.

**Soundness:** An argument is sound if, and only if, it is valid and all of its premises are true.

Which of these arguments are valid? Which have true premises and a true conclusion? Which are sound? If an argument isn't valid (sound), what changes would you suggest to make it valid (sound)?

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| A. (1) Someone is sick.<br>(2) Someone is unhappy.<br>(3) $\therefore$ Someone is sick and unhappy.  | B. (1) Angelina Jolie is famous.<br>(2) Angelina Jolie is an actress.<br>(3) $\therefore$ Angelina Jolie is a famous actress.   |
| C. (1) If it rains, the streets will be wet.<br>(2) If the streets will be wet, more accidents will happen.<br>(3) $\therefore$ If it rains, more accidents will happen. | D. (1) If there is life on Pluto, then Pluto has water.<br>(2) But there is no life on Pluto.<br>(3) $\therefore$ Pluto does not have water.                            |
| E. (1) Cutting people is a crime.<br>(2) Surgeons cut people.<br>(3) $\therefore$ Surgeons are criminals.  | F. (1) If it rained last night, the streets would be wet this morning.<br>(2) But the streets are not wet this morning.<br>(3) $\therefore$ It did not rain last night. |
| G. (1) If I have the flu, then I have a cough.<br>(2) I have a cough.<br>(3) $\therefore$ I have the flu.  | H. (1) If I have the flu, then I have a cough.<br>(2) I have the flu.<br>(3) $\therefore$ I have a cough.   |
| I. (1) Nothing is better than eternal happiness.<br>(2) Eating a cookie is better than nothing.<br>(3) $\therefore$ Eating a cookie is better than eternal happiness.    | J. (1) Dolphins are either fish or mammals.<br>(2) Dolphins are not fish.<br>(2) $\therefore$ Dolphins are mammals.   |

True or false?

- (1) All true statements are valid.
- (2) To show that an argument is unsound, we must show that some of its premises are false.
- (3) An invalid argument must have a false conclusion.
- (4) If all the premises of a valid argument are false, then the conclusion must also be false.
- (5) If all the premises and the conclusion of an argument are true, then the argument is valid.
- (6) All sound arguments are true.
- (7) Any valid argument with a true conclusion is sound.