0 What is an argument?

An argument is a series of *premises* advanced in support of a *conclusion*.

Do not confuse arguments with these:

- Statement of opinion or belief
  - "If public education fails to improve the quality of instruction in both primary and secondary schools, then it is likely that it will lose additional students to the private sector in the years ahead."
- Illustration
  - "A mammal is a vertebrate animal that nurses its offspring. Thus, cats and dogs are mammals, as are sheep, monkeys, rabbits, and bears."
  - "Mosquito bites are not always the harmless little irritations most of us take them to be. For example, some mosquitoes carry West Nile virus, and people who are infected can become very sick or even die."
- Explanation
  - "The turkey vulture is called by that name because its red featherless head resembles the head of a wild turkey."
  - "The sky appears blue from the earth's surface because light rays from the sun are scattered by particles in the atmosphere."

1 Deductive arguments

A *deductive* argument is one in which the premises purport to guarantee the truth of the conclusion.

- A *deductive* argument is *valid* if and only if it's impossible for all of the premises of the argument to be true while the conclusion is false. In other words, *iff* the conclusion follows necessarily from the premises.
- How do you test for this?
  - Recognize that it has a logically valid form. (See below.)
  - Try to imagine a scenario (which doesn't have to be actual) in which the premises are true but the conclusion is false. If you can, it's not valid and you have constructed a *counterexample*.

Argument 1:
P1. The Earth is a planet in our solar system.
P2. All planets in the solar system revolve around the sun.
C. The Earth revolves around the sun.

Argument 2:
P1. Caprica is a planet in our solar system.
P2. All planets in the solar system revolve around the sun.

C. Caprica revolves around the sun.

Some logically valid forms:

- All A's are B's. All B's are C's. Therefore, all A's are C's. (Categorical syllogism)
- Some A's are B's. All B's are C's. Therefore some A's are C's. (Categorical syllogism)
- If P, then Q. P. Therefore, Q. (Modus ponens)
- If P, then Q. Not Q. Therefore, not P. (Modus tollens)
- P or Q. Not Q. Therefore P. (Disjunctive syllogism)
- If P, then Q. If Q, then R. Therefore, if P, then R. (Hypothetical syllogism)

If an argument is valid, that's one sign that it's a good argument. But it should also have all true premises. A *sound* argument is one that's valid and has all true premises.

2 Inductive arguments

Being sound is not the only way for an argument to be good. It could also be a good *inductive* argument.

- An inductive argument is one where the premises do not guarantee the truth of the conclusion, but make it probably true.
- A *strong* argument is an inductive argument where the truth of the premises do make the conclusion more likely to be true. (A *weak* inductive argument is not.)
- It's *cogent* if it's strong and all the premises are true.

Argument 3:
P1. 99.9% of all swans are white.
C. The next swan you see will be white.

3 Summary

So, we've covered two kinds of arguments: deductive and inductive.

- Deductive arguments can be:
  - Valid or invalid
  - Sound or unsound
- Inductive arguments can be:
  - Strong or weak
  - Cogent or uncogent