CRITICAL THINKING

Workshop #4

Creating Valid & Invalid Arguments

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Explanation of Annotations for These Solutions

The problem is in black Futura Std type.

The solution is in red Garamond Premier Pro type.

Any commentary is in blue Futura Std type.

Please Note: When solving these types of problems for a quiz or an exam, you are expected to format your own solutions in a similar manner as I have done on these slides. Failure to do so may result in a small penalty for not following instructions or even a larger penalty because I do not understand your solution.

Part I Solutions

1. A valid argument with one true premise, one false premise, and a false conclusion.

1. Qatar has more people than Bahrain. (*True*: 2,235,355 > 1,377,237.)
2. Bahrain has more people than Iran. (*False*: 1,377,237 < 79,109,272.)

∴ Qatar has more people than Iran. (*False*: 2,235,355 < 79,109,272.)

This argument is *valid*.

Being valid means there is *no* possible way for both premises to be true while the conclusion is false. To see this, assume (for the sake of argument) both premises are actually true. With these both true, the conclusion absolutely must, with a doubt, be true as well: the transitivity of "more people than" ensures that Qatar must be bigger than Iran. There is simply *no* way to create an imaginary example with true premises but a false conclusion.

Part I Solutions

2. An invalid argument with two false premises and a true conclusion.

1.	Bahrain has more people than Qatar.	(*False*: 1,377,237 < 2,235,355.)
2.	Qatar has more people than Iran.	(*False*: 2,235,355 < 79,109,272.)
∴	Iran has more people than Qatar.	(*True*: 79,109,272 > 2,235,355.)

This argument is *invalid*.

Being invalid means that it *is* possible for the premises to be true while the conclusion is false. The easy way to show an argument is invalid is to construct an example with true premises and a false conclusion. To see this, assume (for the sake of argument) both premises are actually true. Even so, the conclusion is now false because the presumed truth of the second premise means it is now Qatar with more people than Iran. So it *is* logically possible to create an example with true premises but a false conclusion.

Part II Solutions

1. An invalid argument with two true premises and a true conclusion.

1.	Qatar has more people than Bahrain.	(*True*: 2,235,355 > 1,377,237.)
2.	Iran has more people than Bahrain.	(*True*: 79,109,272 > 1,377,237.)
∴	Iran has more people than Qatar.	(*True*: 79,109,272 < 2,235,355.)

This argument is *invalid*.

Being invalid means that it *is* possible for the premises to be true while the conclusion is false. Assuming both premises are true only implies that Qatar and Iran are each bigger than Bahrain. It tells us *nothing* at all about the relationship between Qatar and Iran. So even with both premises true, we learn nothing about whether the conclusion is true or false. This means that a false conclusion *is* still possible.

Comment: This shows how every single statement in an argument can be true, and yet that is not enough to make the argument valid. Remember, validity is about the connections/inferences linking those statements together.

Part II Solutions

2. A valid argument with two false premises and a true conclusion.

1. Syria has more people than each GCC member. (*False*: KSA is in the GCC and > Syria.)
2. Israel is a member of the GCC. (*False*: Israel is not in the GCC.)

∴ Syria has more people than Israel. (*True*: 18,502,413 > 8,380,400.)

This argument is *valid*.

Being valid means there is *no* possible way for both premises to be true while the conclusion is false. To see this, assume (for the sake of argument) both premises are true. The first premise then sets up a relationship ("more people than") between Syria and each GCC member, and the second premise means Israel is now in the GCC. As a result, Syria must have that relationship ("more people than") with Israel, meaning that the conclusion absolutely must, with a doubt, be true as well. There is simply *no* way to create an imaginary example with true premises but a false conclusion.

Part II Solutions

3. A valid argument with two true premises and a false conclusion.

This is *impossible* to construct because if an argument is valid and its premises are in fact true, then the conclusion absolutely must be true. A valid argument with two true premises is a *sound* argument. And a sound argument gives us a 100% guarantee of the truth of its conclusion.

Next Class…

You begin the journey into formal logic by learning how to transform statements from English into the symbols of logic.