

Conditionals

Homework

Submit all homework assignments on Canvas as a Word (.doc or .docx) file. So that I can grade anonymously, **please do not include your name** or any other identifying information.

In addition, some exercises include a word limit or word range. For these exercises, strive for concision and simplicity (while still using complete sentences), and **include a word count** for each of your answers.

Exercise 1. Carefully review my comments on your previous homework submission, as well as the answer key.

- (a) What are the most important mistakes that you made? If you did not make any mistakes on the homework, instead tell me the most important mistakes that you made in seminar. (Range: 30-60 words.)
- (b) What specific strategies can you use to avoid such mistakes in the future? Remember to apply these strategies to the rest of this homework! (Range: 30-60 words.)

Note: You will almost certainly get exercise 2 wrong! That is perfectly fine. We will discuss this exercise in detail in seminar, and the reading in the rest of this handout will solidify your understanding. The point of the exercise is simply to help you see what sorts of mistakes you tend to make when you diagram conditional arguments.

Exercise 2. At the beginning of 73d, Socrates offers an argument against Meno's definition of virtue. Diagram this argument *using exactly three claims, including the conclusion*. Remember to include both a numbered list of claims and a picture with an arrow. Hint: the first claim should begin, "if virtue is the ability to rule over people, then"

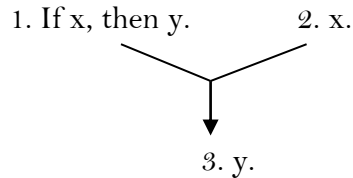
Exercise 3. Around 97d-98a, Socrates uses the metaphor of the statues of Daedalus to explain why knowledge is better than mere true belief. Interpret the metaphor on your own and then fill in the blank below. (Range: 18-28 words).

Socrates claims that knowledge is better than mere true belief because ____.

Reading

The *indicative conditional* is typically expressed by the English phrase "if ... then" The precise logical and linguistic structure of the indicative conditional is disputed. Still, most theorists agree that the two forms of argument below involving the indicative conditional are highly effective. In particular, any argument of these forms must have a true conclusion *as long as* it begins from true evidential claims.

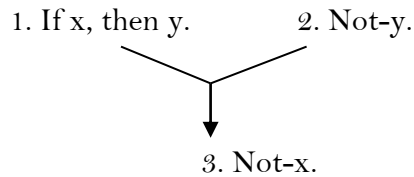
The first effective form of argument is known as *modus ponens*:



Example:

1. If it is raining, then I should carry an umbrella.
 2. It is raining.
- Therefore:
3. I should carry an umbrella.

The second effective form of argument is known as *modus tollens*:

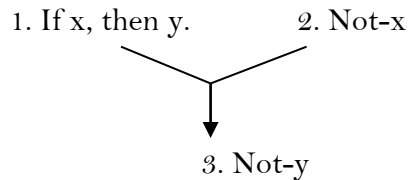


Example:

1. If this whisky is Laphroaig, then it has strong notes of smoked fish.
 2. It does not have strong notes of smoked fish.
- Therefore:
3. This whisky is not Laphroaig.

Though these are not the only effective argument forms involving the indicative conditional, many nearby argument forms are fallacious. Here are two:

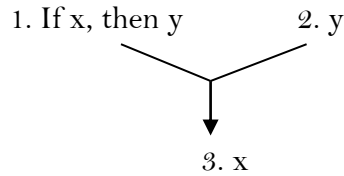
The fallacy of denying the antecedent:



Example:

1. If something is an alligator, then it is green.
 2. This lime is not an alligator.
- Therefore:
3. This lime is not green.

The fallacy of *affirming the consequent*:



Example:

1. If something is an alligator, then it is an animal.
 2. This dog is an animal.
- Therefore:
3. This dog is an alligator.

Note that students who try to use *modus ponens* and *modus tollens* often fail to use these argument forms precisely. Make sure that your *x*'s and *y*'s match *word-for-word*, insofar as possible. You might have to make small exceptions for the sake of grammar – for instance, in many of the examples above, I have allowed for slight slippage with words like “something,” “it,” and “this.” But be as precise as possible.

For example, here is an argument that does not use *modus ponens* precisely:

1. According to Nagasena, if everything is impermanent, then the self does not exist.
 2. The Buddha teaches that nothing is permanent.
-
3. Selves such as you and I do not exist.

The problem is that the *x*'s and *y*'s do not match word-for-word. To make this argument match the *modus ponens* form precisely, we might instead express the argument like this:

1. If everything is impermanent, then the self does not exist.
 2. Everything is impermanent.
-
3. The self does not exist.

Also note that the phrase “if ... then ...” does not always express the indicative conditional. For example, the claim “If I were a basketball player, then I would be much taller” uses a very different kind of conditional known as the *counterfactual conditional*. We will not study these other types of conditionals in this seminar.

Students often have difficulty understanding how to evaluate a conditional claim. Surprisingly, a claim of the form *if x, then y* can be true even if *x* and *y* are both false. For example, it is true that if all animals are birds, then all dogs are birds. But it is false that all animals are birds, and it is also false that all dogs are birds.

Here is one useful method for evaluating a claim of the form *if x, then y*. Assume, just for the sake of argument, that *x* is true. Then consider whether *y* is true, given that assumption. If so, then the conditional claim is true; if not, then the conditional claim is false.¹

¹ Some philosophers think that this method for evaluating conditionals can fail in certain unusual cases, but you are unlikely to run into such cases in this course. Moreover, if you have taken a course on logic, then you may have

Let's use this method on the claim mentioned above that if all animals are birds, then all dogs are birds. We start by assuming, just for the sake of argument, that all animals are birds. Now, we know that all dogs are animals, so given our assumption all dogs must be birds. From this, we can conclude that the claim *if all animals are birds, then all dogs are birds* is true.

Warm-up exercises

First complete all but the last of these exercises on your own. Then check your answers against the answer key that is included at the end of this handout, and use what you have learned to complete the last exercise. Finally, submit all of your answers on Canvas as a Word (.doc or .docx) file.

Some exercises include a word limit or word range. On these exercises, strive for concision and simplicity (while still using complete sentences), and **include a word count**. So that I can grade anonymously, **please do not include your name** or any other identifying information.

Warm-up 1. Fill in the blanks below to create effective arguments or explain why this cannot be done. Hint: avoid using your intuitions. Instead, focus on the form of the argument.

- (a) If roses are red, then _____. Roses are red. Therefore, violets are blue.
- (b) If roses are red, then violets are blue. But _____. Therefore, roses are not red.
- (c) If _____, then you'll let me go. But you won't let me go. Therefore, you don't love me.
- (d) If _____, then virtue can be taught. And virtue is a form of knowledge. Therefore, virtue can be taught.
- (e) If virtue is a form of knowledge, then virtue can be taught. But _____. Therefore, virtue is not a form of knowledge.
- (f) If piety is a type of virtue, then virtue cannot be defined in terms of piety. But piety is not a type of virtue. Therefore, _____.
- (g) If the Earth is larger than the sun, then the Earth is larger than Mars. But _____. Therefore, the Earth is not larger than Mars.
- (h) If the water supply has been poisoned, then _____. But I am not sick. Therefore, _____.

Warm-up 2. Consider the claim that if blorgs are smurfle, then gumps are wumple. Explain how to determine whether or not this claim is true.

Warm-up 3. From 89d-94e of the *Meno*, Socrates gives an extended but simple argument. Diagram this argument using *exactly three claims, including the conclusion*. Remember to include both a numbered list of claims and a picture with an arrow.

Warm-up 4. Carefully review the answer key for the warm-up exercises. Then answer the following questions.

learned some seemingly incompatible information about conditionals. In fact, what is happening is that there are different kinds of conditionals with different logical structures. You were probably learning about the *material conditional*, which is very different from the conditional discussed in this handout.

- (a) What are the most important mistakes that you made? If you did not make any mistakes, then instead reflect on the most important mistakes that you recently made in seminar. (Range: 30-60 words.)
- (b) What specific strategies can you use to avoid these mistakes in the future? (Range: 30-60 words.)

Sample answers to warm-up exercises

Warm-up exercise 1. Fill in the blanks below to create effective arguments or explain why this cannot be done. Hint: avoid using your intuitions. Instead, focus on the form of the argument.

Note: Logic is a branch of mathematics; it requires precision. Thus, your answers should match the answers below *word for word*. If there is any deviation between your answers and the ones below, reflect on how to improve for next time.

- (a) If roses are red, then violets are blue. Roses are red. Therefore, violets are blue.
- (b) If roses are red, then violets are blue. But violets are not blue. Therefore, roses are not red.
- (c) If you love me, then you'll let me go. But you won't let me go. Therefore, you don't love me.
- (d) If virtue is a form of knowledge, then virtue can be taught. And virtue is a form of knowledge. Therefore, virtue can be taught.
- (e) If virtue is a form of knowledge, then virtue can be taught. But virtue cannot be taught. Therefore, virtue is not a form of knowledge.
- (f) If piety is a type of virtue, then virtue cannot be defined in terms of piety. But piety is not a type of virtue. Therefore, no relevant conclusion follows!.
- (g) If the Earth is larger than the sun, then the Earth is larger than Mars. But there is non-trivial way to make the argument good!. Therefore, the Earth is not larger than Mars.
- (h) If the water supply has been poisoned, then I am sick [or, to put it more naturally, "If the water supply had been poisoned, then I would be sick"]. But I am not sick. Therefore, the water supply has not been poisoned.

Warm-up 2. Consider the claim that if blorgs are smurfle, then gumps are wumple. Explain how to determine whether or not this claim is true.

Begin by assuming, just for the sake of argument, that blorgs are smurfle. Then consider whether, given that assumption, gumps are wumple. If so, then the claim is true. If not, then the claim is false.

Note: In the future, remember not to evaluate conditional claims just by using your intuitions! This method will be highly unreliable. Instead, use the method described here.

Warm-up 3. From 89d-94e of the *Meno*, Socrates gives an extended but simple argument. Diagram this argument using *exactly three claims, including the conclusion*. Remember to include both a numbered list of claims and a picture with an arrow.

First possible answer:

1. If virtue can be taught, then there are students and teachers of virtue.
2. There are not students and teachers of virtue.
3. Virtue cannot be taught.

Second possible answer:

1. If virtue can be taught, then there are students and teachers of virtue.
2. There are not students and teachers of virtue.
3. Virtue cannot be taught.

Either way, the diagram will be the same:

