
Dependable Systems

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Training Exercises PT2 (Deductive Arguments)

Issue 1: *At the Heart of Arguments*

(This issue is a modification of exercises in Bowell/Kemp (2015).)

(a) Write a message (e.g. in Signal) to a friend or a familiy member who has nothing to do with philosophy and briefly explain what the principle of charity is and why it is cool[1]. (Whether or not you want to send the message is of course up to you.)

(b) Suppose that someone says that the main purpose of arguments is to defeat the opponent. Why is this wrong?

(c) Mr. Smith says the following:

> Mr. Jones argues that using SHA-1 is sufficient in our use case. However, as we have explained, Mr. Jones' argument is clearly invalid. Furthermore, we have shown that all the premises of the argument are false. Therefore, Mr. Jones is wrong. We can conclude that the use of SHA-1 is not sufficient for our use case.

Criticise Mr. Smith's argument.

Issue 2: *Tabular to logical form*

(a) Bring the following arguments into their logical form.

(b) Are they valid?

(c) Do you think they are sound? Why? Why not?

[1] If you have any doubts that the principle of charity is cool, come and discuss your view with us!

Argument: Wet Ware

P1:	If it rains, your computer is wet.
P2:	Your computer is not wet.
C:	It does not rain.

Argument: SQL Injections

P1:	When you don't properly sanitize your inputs, your system can be attacked with SQL-injections.
C:	You should always properly sanitize your inputs.

Argument: Social Engineering

P1:	All systems are hackable.
P2:	Even if systems are not connected to the internet, it is possible to hack them.
P3:	One possibility to hack a system is to use social engineering.
P4:	Social Engineering does not necessarily involve any attacks on the computer system itself, but rather uses psychological tricks to get access to the system.
C:	All systems are hackable.

Argument: Hacking

P1:	All computer systems can be hacked.
P2:	If a computer system can be hacked, it can be manipulated.
P3:	German systems for counting votes in elections are computer systems.
C:	The computer systems Germany uses for counting votes in elections can be manipulated.

Issue 3: ***Tabular to logical form and back***

In PT2, we briefly mentioned a method to make an argument in tabular form valid that already is *almost* valid:

1. Bring the argument into logical form. (And make sure that this is valid.)
2. Make a list with the names of all identifiers, predicates, constants etc.
3. Map each of the items on the list to the phrase in natural language that it stands for in the tabular argument.
4. Substitute everything in the logical form with your mappings exactly and word by word.

5. Substitute all the logical operators, quantifiers etc with their equivalent in natural language.

6. Make changes such that the sentences become grammatically correct, unambiguous and relatively easy to read. (You may also change certain phrases that sound very awkward to less awkward phrases, but make sure to pay very close attention that you do not destroy validity again. An example would be that you might write "all dogs" instead of "everything that is a dog".) But if in doubt, better make less changes than ending up with an invalid argument.

(a) Make the following two arguments valid using this method:

Argument: A

P1:	Soon we will have autonomous cars that will be such that it is much less likely to cause an accident compared to a human driver in almost all instances.
P2:	In a short time it will be the case that we ought to allow certain autonomous cars, if we will have autonomous vehicles that will, in most cases, be a lot less prone to cause accidents than a human driver.
C:	It will soon be true that we should allow autonomous vehicles with certain properties.

Argument: B

P1:	It is not rational to carry a bugging device with you.
P2:	Everything that has a microphone that can be switched on and send audio to a third party without the users knowledge or control is a bugging device.
C1:	Therefore, it is irrational to carry anything on you that has a microphone that can record and send audio to anyone without the owners control or knowledge. (P1, P2)
P3:	All Smartphones have microphones which can be tapped and used to send audio to a third party without your knowledge.
C:	Therefore, it is irrational to have any smartphone on you. (C1, 3)

(b) You most likely saw that the method worked a lot better on argument A than on argument B. Why is that?

Issue 4: ***Your first valid argument in standard form***

On the last exercise sheet, you wrote arguments in standard form for or against each of the following claims or reasonable conditionalizations thereof.

(I) Children under the age of 10 should not have a smartphone.

(II) Every software should be open-source.

(III) It should be obligatory for high-school students to learn at least a little bit of programming.

Revisit your standard forms and check them for validity. If they are not already valid, improve them such that they become valid.

Issue 5: ***Mix and Match***

Argument: Logical Form 1

P1: $p \to q$
P2: q

C: p

Argument: Logical Form 2

P1: $\neg p \land \neg q$
P2: $r \to \neg(p \lor q)$

C: $\neg r$

Argument: Logical Form 3

P1: $(p \land q) \lor \neg q$
P2: $\neg p$

C: $\neg q$

Argument: Logical Form 4

P1: $p \to \neg q$
P2: $q \lor s$
P3: $\neg s$

C: $\neg p$

Argument: Logical Form 5

P1: Fa
P2: $\forall x : \neg G(x) \lor \neg F(x)$

C: $\neg Ga$

Argument: Logical Form 6

P1: $\forall x : G(x)$
P2: $(\forall x : F(x)) \to (\forall x : G(x))$

C: $\forall x : F(x)$

Argument: Logical Form 7

P1: $\forall x : F(x)$
P2: $\forall x : (G(x) \land F(x)) \to \neg F(x)$

C: $\neg\exists x : G(x)$

Argument: Logical Form 8

P1: $\exists x : F(x) \land (F(x) \to \neg F(x))$

C: $\forall x : G(x)$

(a) Which of the above arguments are valid, which are not valid?

(b) Which of the above logical forms match the following textual forms?

I "Neither are drones harmful, nor are they inherently bad. But only if they are harmful or they are inherently bad, we ought to restrict public access to them. Thus, we ought not to restrict public access to drones."

II "If it rains, the street will be wet soon, and yes, it is raining. Thus, the street will be wet soon."

III "If autonomous cars will cause significantly less harm than the average human driver, we have moral reasons to permit them. But overall we shouldn't permit autonomous cars. Thus, autonomous cars won't cause significantly less harm than the average human driver."

IV "If it rains, the street will be wet soon. And, in fact, the street will be wet soon. Thus, it rains."

V "Socrates is a man. Obviously, some man are mortal. Thus, Socrates is mortal, too."

VI "Everything is red. But everything, that is red and a duck at the same time, is not red at all. Thus, there are no ducks."

VII "There is a true sentence for which it holds that if it is true, then it is false. Thus, all computer scientists are nerds."

VIII "If my coffee machine is broken, I have no coffee in the morning. I have coffee in the morning, or am I tiered all day. But today, I am not tired all day. Thus, my coffee machine is not broken."

IX "This argument is both funny and not funny. If this argument is valid, then a Mix-and-Match exercise has been part of every Ethics for Nerds exam so far. Thus, a Mix-and-Match exercise has been part of every Ethics for Nerds exam so far."

Issue 6: *Why isn't it valid?*

None of the following arguments is logically valid. What makes them logically invalid? How could you fix the problem?

Argument: Argument 1

P1:	If weakening the encryption was the right thing to do, then it would be right to accept possible misuse of the weakening.
P2:	It is not right to accept possible misuse of the weakening.
C:	Thus, we should not weaken the encryption.

Argument: Argument 2

P1:	Encryption is not only used by criminals.
P2:	Normal people, too, use encryption to secure their communication.
C:	We should neither forbid nor weaken encryption by law.

Argument: Argument 3

P1:	If we weaken the encryption then it would be right to accept possible misuse of the weakening.
P2:	It is not right to accept possible misuse of the weakening.
C:	We should not weaken the encryption.

Argument: Argument 4

P1:	You could use spyware to monitor encrypted messages.
P2:	I see that very critical.
C:	If it is allowed then only by court order.

Argument: Argument 5

P1:	If it is reasonable to monitor unencrypted communication channels on a case-by-case basis then it is reasonable to monitor encrypted communication channels on a case-by-case basis.
P2:	It is rational to monitor unencrypted communication channels on a case-by-case basis.
C:	It is reasonable to monitor encrypted communication channels on a case-by-case basis.

Argument: Argument 6

P1:	Surveillance is good for the security of Germany.
P2:	There are two possibilities to monitor encrypted messages: deploy spyware on individual devices or weaken the encryption.
P3:	Weakening the encryption is not a good idea because it allows possible misuse.
C:	We should allow deploying spyware.

Issue 7: *Playing with logical forms*

You are given the following logical form:

Argument:

P1:	$\exists x.P(x) \rightarrow \exists y.Q(y) \wedge R(y)$
P2:	$\forall x.Q(x) \rightarrow \neg R(x)$
P3:	$\exists x.Q(x)$
C:	$\neg\exists x.P(x)$

(a) Is an argument with such a logical form valid?

(b) Can you improve it?

(c) Can you come up with a tabular form that has such a logical form?

Issue 8: *Own Arguments*

Come up with a sound argument for or against the following claims or a reasonable conditionalization thereof. Give soundness reasoning.

(a) Script blockers help to keep a system secure.

(b) Mark Zuckerberg should implement a system against filter bubbles in Facebook.

(c) If autonomous cars are reasonably reliable, they ought to be introduced.

Issue 9: *Soundness, again*

Check the soundness of this argument:

Argument:

P1:	If there is a person who is overall harmed by a technology, it is not allowed to introduce this technology.
P2:	A person is overall harmed by a technology if they were overall better off without the introduction of the technology.
P3:	Some people are overall better off without autonomous cars.
C:	It is not allowed to introduce autonomous cars.