# Solutions to Exercises for *Introduction to Logic*

Robert Craven and Florian Steinberger

**Exercise 1.1**
1. Every cat has a hat.
9 letter types: 'a', 'c', 'e/E', 'h', 'r', 's', 't', 'v', 'y'.
5 word types: 'Every', 'cat', 'has', 'a', 'hat'.
'a' instantiated 4 times; 't', twice; 'd', not at all.
'cat' instantiated once; 'hat', once.

2. I have a hat.
6 letter types: 'a', 'e', 'h', 'I', 't', 'v'.
4 word types: 'I', 'have', 'a', 'hat'.
'a' instantiated 3 times; 't', once; 'd', not at all.
'cat' not instantiated; 'hat', once.

3. Therefore, I am a cat.
10 letter types: 'a', 'c', 'e', 'f', 'h', 'm', 'I', 'o', 'r', 't/T'.
5 word types: 'Therefore' 'I', 'am', 'a', 'cat'.
'a' instantiated 3 times; 't', twice; 'd', not at all.
'cat' instantiated twice; 'hat', not at all.

The lot:
13 letter types: 'a', 'c', 'e/E', 'f', 'h', 'I', 'm', 'o', 'r', 's', 't/T', 'v', 'y'.
9 word types: 'Every', 'cat', 'has', 'a', 'hat', 'I', 'have', 'Therefore', 'am'.
'a' instantiated 10 times; 't', five times; 'd', not at all.
'cat' instantiated twice; 'hat', twice. ⌟

**Exercise 1.2**
1. Aristotle has nine letters.
Note first that the use of "utters" implies the sentence was spoken, and here the lack of written quotation marks to report the utterance suggests that there was no overt use of anything—such as 'quotation fingers'—to indicate that the expression 'Aristotle' is being mentioned not used.
(i) The *most straightforward* interpretation is probably that there has been a mistake, and quotation marks around 'Aristotle' had been intended.
(ii) We could vary the interpretation of only 'letters': missives, blocks with letters on them.
(iii) Vary interpretation of only 'has': 'has in mind', 'identified in the game', etc.
(iv) *Maybe* vary interpretation only of 'Aristotle': establish a temporary convention whereby it refers to, e.g., the word 'Aristotle'. (But perhaps we are working with a convention whereby the reference of names is held fixed.)
(v) A combination of (ii)–(iv).

2. This sentence has 24 symbols.
(i) The *most straightforward* interpretation is probably that the sentence has 24 letter tokens in it (probably not including the full stop, '.').
(ii) 'Symbols' could be letter-types; and we might include '.' or not (is it part of the sentence?).
(iii) 'Symbols' could be letter-tokens; and again, we might include '.' or not.
(iv) 'Symbols' could be the word-types; or the word-tokens.
(v) 'has' could be the straightforward sense (composition of an expression by a sub-expression); or it could mean 'surrounding it in adjacent text', or the whole sentence could mean 'This sentence

is associated with 24 mystical symbols in the works of Jakob Boehme', etc.
(vi) 'This sentence' might refer to the type of the sentence itself.
(vii) 'This sentence' might refer to particular token that is the sentence itself.
(viii) 'This sentence' might refer to a type or token of some other sentence (e.g., ''The past is a foreign country: they do things differently there' opens the novel *The Go-Between*. This sentence has 24 symbols').

3. 'This sentence' has twelve symbols.
(i) The *most straightforward* interpretation is probably where the sentence claims that 'This sentence' is made of 12 letter-tokens.
(ii) (Most of what's said above, for (2), for 'symbols', 'has'.)
(iii) Since the convention has been stated that the use of quotation marks refers to (mentions) the expression-type, then the interpretation of 'This sentence' is fixed. ⌟

**Exercise 1.3**
1. 'Aristotle' is being used, and Aristotle is being mentioned.

2. ''Aristotle'' is being used, and 'Aristotle' (the expression) is being mentioned.

3. The first: 'Aristotle' is being used, and Aristotle is being mentioned. The second: ''Aristotle'' is being used, and 'Aristotle' (the expression) is being mentioned.

4. The first: '''Aristotle''' is being used, and ''Aristotle'' is being mentioned. The second: ''Aristotle'' is being used, and 'Aristotle' is being mentioned.

5. First: ''Aristotle'' used, 'Aristotle' mentioned. Second: ''Aristotle'' used, 'Aristotle' mentioned. Third: 'Aristotle' used, Aristotle mentioned. Fourth: '''Arisotle''' used, ''Aristotle'' mentioned. Fifth: 'Aristotle' used, Aristotle mentioned. Sixth: ''Aristotle'' used, 'Aristotle' mentioned.

6. ''Snow is white'' is being used, 'Snow is white' mentioned.

7. First: ''use'' is being used, and 'use' mentioned. Second: ''mention'' is being used, and 'mention' is being mentioned. Third: ''The use of 'use' and 'mention' helps to distinguish use and mention'' is being used, and 'The use of 'use' and 'mention' helps to distinguish use and mention' is being mentioned.

8. ''Toying with the distinction between use and mention'' is being used, and 'Toying with the distinction between use and mention' is being mentioned. ''all there is to life, you know?'' is being used, and 'all there is to life, you know?' is being mentioned.

9. ''onion rings'', ''lettuce leaves'' and ''chips as a side'' are being used, and 'onion rings', 'lettuce leaves' and 'chips as a side' are being mentioned. ⌟

**Exercise 1.4**
(Are the sentences declarative? NOTE: your views on controversial issues in philosophy should determine your views on some of the questions here. So, disagreement is possible.)
1. Yes. (Yes, that is, if 'Anna' and 'Herb' are presumed to refer to some real people, or animals, etc. But it could be that they are fictional characters—e.g., in the awful play, *When Herb Met Anna*. In the latter case, whether or not the sentence is declarative will depend on the stance taken about fictional characters in general. Cf. the debate about 'Sherlock Holmes' in the notes.)
2. Yes. (Same as (1).)
3. Yes. (Same as (1).)
4. Yes. (Same as (1).)
5. Yes. (Same as (1).)
6. Yes. (Same as (1).)
7. No. (Two sentences, neither of which is declarative.)
8. Yes.
9. This is a bit complicated. If 'The square root of onion soup' is to be considered as a name which doesn't refer, then the sentence counts as *not declarative*, given our definition. We might also say

that 'The square root of onion soup' is, though not a name, a referring expression; and that since it doesn't refer, then the same applies as for non-referring names: *not declarative*. However, some philosophers have thought that expressions like 'The square root of onion soup' should not be treated like names—in which case, the sentence would be a nonsensical category error, and hence false on our definition. Since false, then it would be a declarative sentence.
10. Yes or no: the sentence could be uttered by a fictional character.
11. Yes.
12. Yes. (Under some assumptions: what are they?)
13. Yes (if it's a normative sentence and these are declarative), or no (if it's a command). (It is unlikely to be a prediction.)
14. No (again, a command).
15. No.
16. Yes.
17. Yes or no (probably depends on the nature of ethical/political claims).
18. Yes.
19. *Big pain.* Perhaps not (if true, it's false; if false, it's true; either way, there's a contradiction, so it is neither; since neither true nor false, it ain't declarative). Or is it somehow nonsensical in a category-error kind of way—in which case our convention would make it false? ⌟