Peter Smith, *Introduction to Formal Logic* (CUP, 2nd edition)

Exercises 4

Which of the following arguments are valid? Where an argument is valid, sketch an informal proof. Some of the examples are enthymemes that need repair.

(1) Only logicians are good philosophers. No existentialists are logicians. Some existentialists are French philosophers. So, some French philosophers are not good philosophers.

(2) No philosopher is illogical. Jones keeps making argumentative mistakes. No logical person keeps making argumentative mistakes. All existentialists are philosophers. So, Jones is not an existentialist.

(3) No experienced person is incompetent. Jenkins is always blundering. No competent person is always blundering. So, Jenkins is inexperienced.

(4) Jane has a first cousin. Jane's father is an only child. So, if Jane's mother hasn't a sister, she has a brother.

(5) Every event is causally determined. No action should be punished if the agent isn't responsible for it. Agents are only responsible for actions they can avoid doing. Hence no action should be punished.

(6) Some chaotic attractors are not fractals. All Cantor sets are fractals. Hence some chaotic attractors are not Cantor sets.

(7) Something is an elementary particle only if it has no parts. Nothing which has no parts can disintegrate. An object that cannot be destroyed must continue to exist. So an elementary particle cannot cease to exist.

(8) Either the butler or the cook committed the murder. The victim died from poison if the cook was the murderer. The butler carried out the murder only if the victim was stabbed. The victim didn't die from poison. So, the victim was stabbed.

(9) Superman is none other than Clark Kent. The Superhero from Krypton is Superman. The Superhero from Krypton can fly. Hence Clark Kent can fly.

(10) Jack is useless at logic or he simply isn't ready for the exam. Either Jack will fail the exam or he is not useless at logic. Either it's wrong that he won't fail the exam or he is ready for it. So Jack will fail.

(11) Any elephant weighs more than any horse. Some horses weigh more than any donkey. Hence any elephant weighs more than any donkey.

(12) When I do an example without grumbling, it is one that I can understand. No easy logic example ever makes my head ache. This logic example is not arranged in regular order, like the examples I am used to. I can't understand these examples that are not arranged in regular order, like the examples I am used to. I never grumble at an example, unless it gives me a headache. So, this logic example is difficult.

Finally, an example that requires a minimal amount of arithmetical knowledge:

(13) $\sqrt{2}$ cannot be a rational number, i.e. a fraction. We can show this as follows. Suppose $\sqrt{2} = m/n$, where this fraction is in lowest terms. Then (i) $m^2 = 2n^2$, so m is even, and hence $m = 2k$. (ii) Then $n^2 = 2k^2$, so n is even, and hence m isn't (or else m/n wouldn't be in lowest term). Hence (iii) our supposition leads to contradiction.

Set this out as a line-by-line reductio proof, annotating the justification of each line.