

Mathematics 1001H – Precalculus Mathematics

TRENT UNIVERSITY, Summer 2016

Assignment #4

And now for something a little different ...

Due on Tuesday, 7 June, 2016.

The planet Logopolis is inhabited only by jedi and sith. Jedi always tell the truth, and sith always lie. You meet five inhabitants: Boz, Alik, Zip, Marg, and Zoy.

- Boz says that Zip and Zoy are sith.
- Alik says, “Zoy is a sith and I am a jedi.”
- Zip says that at least one of the following is true: that Marg is a jedi or that Alik is a jedi.
- Marg says that it’s false that Boz is a sith.
- Zoy says that at least one of the following is true: that Marg is a jedi or that Boz is a sith.

1. Determine who is a jedi and who is a sith as best you can. [10]

NOTE: This is a slight adaptation of puzzle #151 at:

<http://philosophy.hku.hk/think/logic/knights.php>

(No solutions are given there, but there are many more such puzzles. :-)

SOLUTION. We will consider the alternatives that (i) Boz is a sith or that (ii) Boz is a jedi. One of these will turn out to be impossible, while the other will allow us to deduce the kind of each of the other inhabitants.

(i) Suppose Boz is a sith. Then the statement “It’s false that Boz is a sith” is false, so Marg must be a sith as well. However, at least one of “Marg is a jedi or Boz is a sith” is still true, so Zoy must be a jedi. As the statement “Zoy is a sith” must then be false, Alik’s statement that “Zoy is a sith and I am a jedi” is false as well, and so Alik must be a sith. But then neither of “ Marg is a jedi or Alik is a jedi” is true, so Zip’s statement that at least one them is true is false, and so Zip is a sith as well. Note that if Zoy is a jedi and Zip is a sith, the statement that “Zip and Zoy are sith” is false, which is consistent with the initial assumption that Boz is a sith.

(ii) Suppose, on the other hand, that Boz is a jedi. Then the statement “It’s false that Boz is a sith” is true, so Marg must be a jedi as well. It follows that at least one of “Marg is a jedi or Boz is a sith” is true, so Zoy must be a jedi. However, this makes Boz’s statement “Zip and Zoy are sith” false, which is impossible if Boz is really a jedi. It follows that Boz cannot be a jedi, and hence that alternative (i) applies.

Having eliminated alternative (ii) as being impossible, the conclusions drawn in alternative (i) must apply: Boz, Alik, Zip, and Marg are sith, and Zoy is a jedi. ■