



PROBLEM OF THE WEEK #7  
(Fall 2016)


Some of the citizens of Transylvania are human; the others are vampires. The humans always try to tell the truth, and the vampires always try to lie. Unfortunately, some of the inhabitants are insane: when a claim is true, the insane citizens believe it to be false, and *vice versa*. The sane Transylvanians, on the other hand, are completely accurate: they always know which claims are true and which are false. This means that sane humans make only true statements, and so do insane vampires, while insane humans and sane vampires make only false statements.

The Transylvanian police arrested two suspects,  $A$  and  $B$ . At their trial,  $A$  said that  $B$  was sane, and  $B$  said that  $A$  was insane. Angered,  $A$  called  $B$  a vampire, to which  $B$  replied that  $A$  was only human.

What can you deduce about the suspects?

**Solution:**

$A$  is a sane vampire and  $B$  is an insane human.

*Proof.*  $A$ 's claims must either be both true or both false. If they are both true, then  $B$  is a sane vampire. If they are both false, then  $B$  is an insane human. Either way,  $B$ 's claims are both false. This makes  $A$  a sane vampire. Hence  $A$ 's claims are both false. This makes  $B$  an insane human. 

**Source:** Smullyan, Raymond. *The Lady or the Tiger? and other logic puzzles*. New York: Alfred A. Knopf (1982), pp. 50-51, 57.