

Math 8: Knights and Knaves

Spring 2011; Helena McGahagan

Imagine an island inhabited only by knights and knaves. The only difference between the two groups is that knights always tell the truth and knaves always lie. (These puzzles were popularized in books by Raymond Smullyan. You can find many more puzzles at <http://philosophy.hku.hk/think/logic/knight.php>)

1. Think of a sentence that no one on this island can ever say!
2. You meet two people from this island: Alex and Betty. Alex claims that Betty is a knave, but Betty says, “Neither Alex nor I are knaves.” Can you tell what Alex and Betty are?
3. Alice, Brian, and Charlie are from the island of knights and knaves. Alice claims, “Charlie could tell you that I am a knight.” Brian says, “Either Alice is a knave or I am a knight.” Charlie says that the others are either both knaves or both knights. What are Alice, Brian, and Charlie?
4. You are in a maze on the island of knights and knaves. There are two doors: you know that one leads to freedom and one leads to certain doom. There are two guards nearby, and you happen to know that one is a knight and one is a knave, but you don’t know who is who. They allow you to ask one of them a single question before you choose a door – what do you ask?
5. Dan, Ellen, Fred, Grace, and Hugh are from the island of knights and knaves. You hear them say the following:

Dan: “Fred and Hugh are knights.”

Ellen: “Fred and I are different.”

Fred: “Ellen is a knave.”

Grace: “Dan is not a knave.”

Hugh: “Fred and Dan are either both knights or both knaves.”

Who is who?

6. Ian, Jen, and Kate are from the island. Ian tells you that Jen is a knave or Kate is a knight. Jen tells you that Kate is a knave. Kate says that only a knave would say that Ian is a knave. Can you tell who is a knight and who is a knave?

Other people have found out about the knights and knaves, and some have moved to the island. Now, there are three groups on the island: knights, knaves, and normals. Knights still always tell the truth, knaves always lie, but normals can do either.

1. Amy, Bob, and Celine are from the island of knights, knaves, and normals. One of them is a knight, one is a knave, and one is normal. Amy says that Celine is a knave. Bob says that Amy is a knight. Celine claims that she is a normal. Can you figure out who is who?

2. You meet three people from this island; you know that one is a knight, one is a knave, and one is normal. Can you figure out in three questions who is who? (You can base what question you ask second on the answer you get to your first question, and so on.) Can you figure out in only two questions who the normal is?

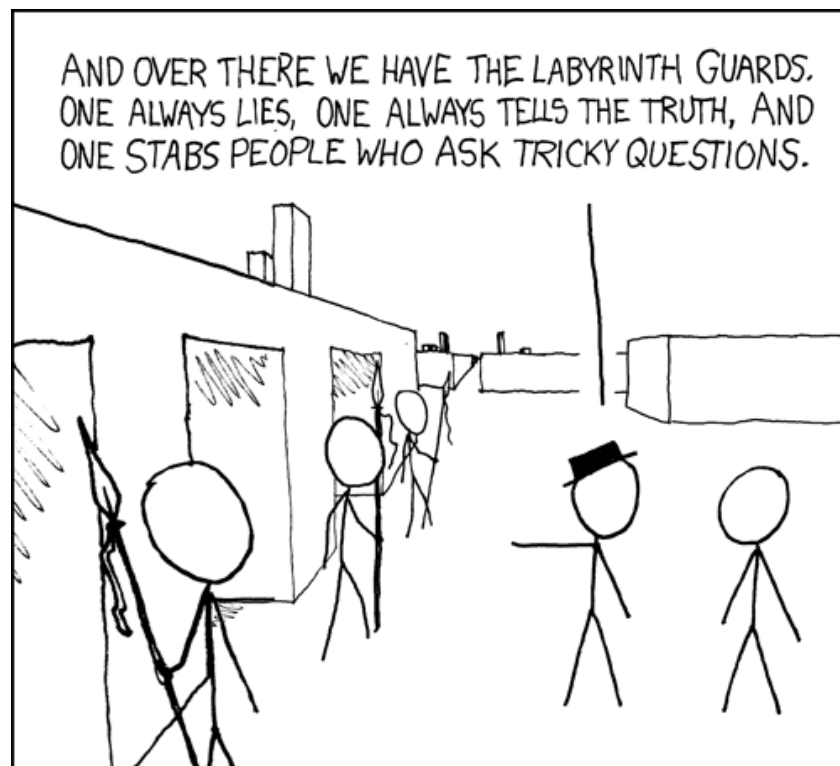


Figure 1: <http://xkcd.com/246/>