

LOGIC

QUIZ #4

B. Mishra

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Once again, we visit several Islands in the Archipelago of Knights and Knaves along with our Antropologist. In these islands, those called *knights* always tell the truth and *knaves* always lie. Furthermore, each inhabitant is either a knight or a knave.

Notation: K = knight, $\neg K$ = knave

Q1. [5] On one of these islands, an inhabitant makes the following two separate statements:

- There is gold on this island.
- If there is gold here, then there is diamond, too.

Is he a knight or knave? Does the island have gold? Does the Island have diamond?

Soln1. The statements are $S_1 \equiv G$ and $S_2 \equiv G \Rightarrow D \equiv \neg G \vee D$. Note that if S_1 is false then S_2 is true. So the only possibility is that S_1 and S_2 are both true. Thus the inhabitant is a knight and the island has gold as well as diamond.

Q2. [5] On one of these islands, the inhabitants will respond to any k -CNF for $k \geq 2$. Can you use this to find out if someone is a knight?

Soln2. Let the statement S be $S \equiv K \vee \neg K$, a 2-CNF with one clause and also a tautology. Since only a knight will assert S (which is always true), it is simple to determine if someone is a knight or knave.