

## **COURSE: DISCRETE MATHEMATICS**

### **Exercise 1.2**

#### **Question no: 16**

**Question:** An explorer is captured by a group of cannibals. There are two types of cannibals-those who always tell the truth and those who always lie. The cannibals will barbecue the explorer unless he can determine whether a particular cannibal always lies or always tells the truth. He is allowed to ask the cannibal exactly one question.

- a) Explain why the question “Are you a liar?” does not work.
- b) Find a question that the explorer can use to determine whether the cannibal always lies or always tells the truth.

#### **Answer:**

- a) If the explorer asks the question Are you a liar? to a liar, the liar will answer no as he always lies. If the explorer asks the same question to a non-liar, the person will answer no as he always tells the truth. Since the explorer gets the same answer from both a

liar and a non-liar, there is no way to distinguish them by this question.

- b) The explorer needs to ask a question for which both he and the cannibal know the answer, in which case he will know right away if the cannibal lies. Like the question "Are you a cannibal?" works because the Truth Teller will tell him "Yes" because he is telling the truth, he is a cannibal.  
And the Liar will tell him "No". But the explorer knows that they are all cannibals.  
So the explorer will know he is lying or not.

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