12. This system is consistent. We use $L$, $Q$, $N$, and $B$ to stand for the basic propositions here, “The file system is locked,” “New messages will be queued,” “The system is functioning normally,” and “New messages will be sent to the message buffer,” respectively. Then the given specifications are $\neg L \rightarrow Q$, $\neg L \leftrightarrow N$, $\neg Q \rightarrow B$, $\neg L \rightarrow B$, and $\neg B$. If we want consistency, then we had better have $B$ false in order that $\neg B$ be true. This requires that both $L$ and $Q$ be true, by the two conditional statements that have $B$ as their consequence. The first conditional statement therefore is of the form $F \rightarrow T$, which is true. Finally, the biconditional $\neg L \leftrightarrow N$ can be satisfied by taking $N$ to be false. Thus this set of specifications is consistent. Note that there is just this one satisfying truth assignment.

14. This is similar to Example 6, about universities in New Mexico. To search for hiking in West Virginia, we could enter WEST AND VIRGINIA AND HIKING. If we enter (VIRGINIA AND HIKING) NOT WEST, then we’ll get websites about hiking in Virginia but not in West Virginia, except for sites that happen to use the word “west” in a different context (e.g., “Follow the stream west until you come to a clearing”).

16. a) If the explorer (a woman, so that our pronouns will not get confused here—the cannibals will be male) encounters a truth-teller, then he will honestly answer “no” to her question. If she encounters a liar, then the honest answer to her question is “yes,” so he will lie and answer “no.” Thus everybody will answer “no” to the question, and the explorer will have no way to determine which type of cannibal she is speaking to.

b) There are several possible correct answers. One is the following question: “If I were to ask you if you always told the truth, would you say that you did?” Then if the cannibal is a truth teller, he will answer yes (truthfully), while if he is a liar, then, since in fact he would have said that he did tell the truth if questioned, he will now lie and answer no.

18. We will translate these conditions into statements in symbolic logic, using $j$, $s$, and $k$ for the propositions that Jasmine, Samir, and Kanti attend, respectively. The first statement is $j \rightarrow \neg s$. The second statement is $s \rightarrow k$. The last statement is $\neg k \lor j$, because “unless” means “or.” (We could also translate this as $k \rightarrow j$.)

From the comments following Definition 5 in the text, we know that $p \rightarrow q$ is equivalent to “$q$ unless $\neg p$. In this case $p$ is $\neg j$ and $q$ is $\neg k$.) First, suppose that $s$ is true. Then the second statement tells us that $k$ is also true, and then the last statement forces $j$ to be true. But now the first statement forces $s$ to be false. So we conclude that $s$ must be false; Samir cannot attend. On the other hand, if $s$ is false, then the first two statements are automatically true, not matter what the truth values of $k$ and $j$ are. If we look at the last statement, we see that it will be true as long as it is not the case that $k$ is true and $j$ is false. So the only combinations of friends that make everybody happy are Jasmine and Kanti, or Jasmine alone (or no one!).

20. If $A$ is a knight, then his statement that both of them are knights is true, and both will be telling the truth. But that is impossible, because $B$ is asserting otherwise (that $A$ is a knave). If $A$ is a knave, then $B$’s assertion is true, so he must be a knight, and $A$’s assertion is false, as it should be. Thus we conclude that $A$ is a knave and $B$ is a knight.

22. We can draw no conclusions. A knight will declare himself to be a knight, telling the truth. A knave will lie and assert that he is a knight. Since everyone will say “I am a knight,” we can determine nothing.

24. Suppose that $A$ is the knight. Then because he told the truth, $C$ is the knave and therefore $B$ is the spy. In this case both $B$ and $C$ are lying, which is consistent with their identities. To see that this is the only solution, first note that $B$ cannot be the knight, because of his claim that $A$ is the knight (which would then have to be a lie). Similarly, $C$ cannot be the knight, because he would be lying when stating that he is the spy.

26. There is no solution, because neither a knight nor a knave would ever claim to be the knave.