

## Solution to Knights/Knaves Puzzle

Solution: Bruce is a knight, Cathy is a knave, and we don't know what Andrea is.

*Step 1: Proof that Andrea said "I'm a knave."* Andrea answers your question: she says either "I am a knight" or "I am a knave." If she is a knave, then she would lie and say, "I'm a knight." If she is a knight, then she would tell the truth and say, "I'm a knight." So, on either assumption (Andrea is a knave or Andrea is a knight), she must have said, "I'm a knight."

*Step 2: Proof that Bruce is a knight.* Bruce told the truth when he reported what Andrea answered. By hypothesis, once a truth-teller, always a truth-teller. So, Bruce must be a knight.

*Step 3: Proof that Cathy is a knave.* Cathy said, referring to Andrea and Bruce, "They are knaves." That's false, because B is a knight. By hypothesis, once a liar, always a liar. So, Cathy is a knave.

*Step 4: Why we don't know what Andrea is.* You might think that we can conclude that Andrea is a knave, on the grounds that Cathy, who is a knave, said falsely of Andrea and Bruce, "They are knaves." But Cathy's statement is false whether or not Andrea is a knight, since Bruce is a knight. Comparison: I say "Bush and Cheney are both sons of U.S. presidents"; what I say is false, even though Bush is a son of a U.S. president. So, that argument doesn't work. The information provided is consistent with the assumption that Andrea is a knave or a knight.