

To implement these propositions in Python and generate truth tables, let's break down each statement into logical expressions. I'll show how you can represent each proposition using Python's logical operators and then create truth tables.

Let's assign variables to each component in the propositions:

1. **Proposition a:** "It is raining outside if and only if it is a cloudy day."

- Let **R** represent "It is raining outside."
- Let **C** represent "It is a cloudy day."
- The expression is: $R \leftrightarrow C$ (R if and only if C).

2. **Proposition b:** "If you get a 100 on the final exam, then you earn an A in the class."

- Let **G** represent "You get a 100 on the final exam."
- Let **A** represent "You earn an A in the class."
- The expression is: $G \rightarrow A$ (if G, then A).

3. **Proposition c:** "Take either 2 Advil or 3 Tylenol."

- Let **A** represent "Take 2 Advil."
- Let **T** represent "Take 3 Tylenol."
- The expression is: $A \vee T$ (either A or T).

4. **Proposition d:** "She studied hard or she is extremely bright."

- Let **S** represent "She studied hard."
- Let **B** represent "She is extremely bright."
- The expression is: $S \vee B$ (S or B).

5. **Proposition e:** "I am a rock and I am an island."

- Let **R** represent "I am a rock."
- Let **I** represent "I am an island."
- The expression is: $R \wedge I$ (R and I).

Explanation of the Code

1. **Truth Table Generator:** The `print_truth_table` function takes a proposition, the list of variable values, and a function (`expression_func`) that calculates the truth value of the proposition.
2. **Lambda Functions:** Each lambda function represents the logical expression for the corresponding proposition.
3. **Result:** This script will print truth tables for each proposition by evaluating the logical expressions for all combinations of True and False values.

Let me know if you'd like me to run the code or need further assistance!