

Example

You are about to leave for school in the morning and discover that you don't have your glasses. You know the following statements are true:

- a. If I was reading the newspaper in the kitchen, then my glasses are on the kitchen table.
- b. If my glasses are on the kitchen table, then I saw them at breakfast.
- c. I did not see my glasses at breakfast.
- d. I was reading the newspaper in the living room or I was reading the newspaper in the kitchen.
- e. If I was reading the newspaper in the living room then my glasses are on the coffee table.

Where are the glasses?

Example

Answer

Let

RK = I was reading the newspaper in the kitchen.

GK = My glasses are on the kitchen table.

SB = I saw my glasses at breakfast.

RL = I was reading the newspaper in the living room.

GC = My glasses are on the coffee table.

Here is a sequence of steps you might use to reach the answer, together with the rules of inference that allow you to draw the conclusion of each step:

- $RK \rightarrow GK$ by (a)
- $GK \rightarrow SB$ by (d)
- $\therefore RK \rightarrow SB$ by transitivity
- $RK \rightarrow SB$ by the conclusion of (1)
- $\sim SB$ by (c)
- $\therefore \sim RK$ by modus tollens
- $RL \vee RK$ by (d)
- $\sim RK$ by the conclusion of (2)
- $\therefore RL$ by elimination
- $RL \rightarrow GC$ by (e)
- RL by the conclusion of (3)
- $\therefore GC$ by modus ponens

Thus the glasses are on the coffee table.