

Determine whether the argument given here is valid and determine whether its conclusion must be true because of the validity of the argument.

“If $\sqrt{2} > \frac{3}{2}$, then $(\sqrt{2})^2 > (\frac{3}{2})^2$. We know that $\sqrt{2} > \frac{3}{2}$. Consequently, $(\sqrt{2})^2 = 2 > (\frac{3}{2})^2 = \frac{9}{4}$.”

Show that the premises “It is not sunny this afternoon and it is colder than yesterday,” “We will go swimming only if it is sunny,” “If we do not go swimming, then we will take a canoe trip,” and “If we take a canoe trip, then we will be home by sunset” lead to the conclusion “We will be home by sunset.”

Show that the premises “If you send me an e-mail message, then I will finish writing the program,” “If you do not send me an e-mail message, then I will go to sleep early,” and “If I go to sleep early, then I will wake up feeling refreshed” lead to the conclusion “If I do not finish writing the program, then I will wake up feeling refreshed.”

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?

Use rules of inference to show that the hypotheses “If it does not rain or if it is not foggy, then the sailing race will be held and the lifesaving demonstration will go on,” “If the sailing race is held, then the trophy will be awarded,” and “The trophy was not awarded” imply the conclusion “It rained.”

Show that the premises “Everyone in this discrete mathematics class has taken a course in computer science” and “Marla is a student in this class” imply the conclusion “Marla has taken a course in computer science.”

Show that the premises “A student in this class has not read the book,” and “Everyone in this class passed the first exam” imply the conclusion “Someone who passed the first exam has not read the book.”

Use quantifiers and predicates with more than one variable to express these statements.

- a)** Every computer science student needs a course in discrete mathematics. **b)** There is a student in this class who owns a personal computer. **c)** Every student in this class has taken at least one computer science course. **d)** There is a student in this class who has taken at least one course in computer science. **e)** Every student in this class has been in every building on campus. **f)** There is a student in this class who has been in every room of at least one building on campus.
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