

Tutorial 1

CSCI2110/MATH2080: Discrete Mathematics

1.1 - Propositional Logic

1.2 - Applications of Propositional Logic

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Question 1 - Zebra Puzzle

(From Albert Einstein!) Five men with different nationalities and with different jobs live in consecutive houses on a street. These houses are painted different colors. The men have different pets and have different favorite drinks. Determine who owns a zebra and whose favorite drink is mineral water given these clues: The Englishman lives in the red house. The Spaniard owns a dog. The Japanese man is a painter. The Italian drinks tea. The Norwegian lives in the first house on the left. The green house is immediately to the right of the white one. The photographer breeds snails. The diplomat lives in the yellow house. Milk is drunk in the middle house. The owner of the green house drinks coffee. The Norwegian's house is next to the blue one. The violinist drinks orange juice. The fox is in a house next to that of the doctor. The horse is in a house next to that of the diplomat.

Question 2 - Sentences to Propositional Logic

Let p be “You drive over 100 km/h”. Let q be “You get a speeding ticket”. Write these propositions using p and q and logical connectives (including negations):

- 1 You do not drive over 100 km/h.
- 2 You drive over 100 km/h but you do not get a speeding ticket.
- 3 You will get a speeding ticket if you drive over 100 km/h.
- 4 If you do not drive over 100 km/h then you will not get a speeding ticket.
- 5 Driving over 100 km/h is sufficient for getting a speeding ticket.
- 6 You get a speeding ticket, but you do not drive over 100 km/h.
- 7 Whenever you get a speeding ticket, you are driving over 100 km/h.

Question 3 - Truth Table

Construct a truth table for the following compound proposition:

$$(p \oplus q) \rightarrow (p \oplus \neg q)$$