Homework 2

1. Consider the following premises:
   (a) If it is not raining and it is not snowing, then the baseball game will be played and we will watch it.
   (b) If the baseball game is played, the Cubs will win.
   (c) The Cubs did not win a baseball game and it did not rain.

   First, use propositional variables and logical connectives to turn these premises into logical formulas. Then use the rules of inference to justify the conclusion "It snowed".

2. Use the rules of inference to deduce the conclusion, "¬q" from the following premises:
   (a) ¬p ∨ q → r
   (b) s ∨ ¬q
   (c) ¬t
   (d) p → t
   (e) ¬p ∧ r → ¬s

3. Turn these premises of Lewis Carroll\(^1\) into logical formulas and use the rules of inference to justify the conclusion, "This example is not easy."
   (a) When I work a logic example without grumbling, you may be sure it is one I understand.
   (b) The premises in this example are not arranged in their usual order.
   (c) No easy examples make my head ache.
   (d) I cannot understand examples if their premises are not arranged in their usual order.
   (e) I never grumble at an example unless it gives me a headache.

4. Prove that the difference of two odd numbers is even.

5. Prove by contraposition that if the sum of two numbers is greater than 10, then one of the numbers is greater than 5.

6. Prove that for any integer \( n \), \( 3n + 2 \) is not divisible by 3.

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\(^1\)Lewis Carroll, *Symbolic Logic*