

Foundations of Discrete Mathematics
COT 2104

Practice 2

1. Show that each of these implications is a tautology by using truth tables.
 - a. $(p \wedge q) \rightarrow p$
 - b. $p \rightarrow (p \vee q)$
 - c. $\neg p \rightarrow (p \rightarrow q)$
 - d. $(p \wedge q) \rightarrow (p \rightarrow q)$

2. What rule of inference is used in each of these arguments?
 - a. Alice is a mathematics major. Therefore, Alice is either a mathematics major or a computer science major.
 - b. Jerry is a mathematics major and a computer science major. Therefore, Jerry is a mathematics major.
 - c. If I go swimming, then I will stay in the sun too long. If I stay in the sun too long, then I will sunburn. Therefore, if I go swimming, then I will sunburn.
 - d. It is either hotter than 100 degrees today or the pollution is dangerous. It is less than 100 degrees outside today. Therefore, the pollution is dangerous.

3. Construct an argument using rules of inference to show that the hypotheses "Randy works hard," "If Randy works hard, then he is a dull boy," and "If Randy is a dull boy, then he will not get the job" imply the conclusion "Randy will not get the job."

4. Construct an argument using rules of inference to show that the hypothesis "If it does not rain or if it is not foggy, then the sailing race will be held and the and the lifesaving 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."