

Tutorial Sheet 5 (Propositional Logic)

1. Which of the following sentences are propositions ? What are the truth values of those that are propositions ?
 - (a) $2 + 3 = 5$
 - (b) $5 + 7 = 10$
 - (c) $\frac{1}{2}$ is an integer
 - (d) Answer this question.

2. What are the negation of each of the following propositions ?
 - (a) Today is Friday.
 - (b) There is no pollution in Hong Kong.
 - (c) $2 + 3 = 5$

3. Let p and q be the propositions
 - p : It is below freezing.
 - q : It is snowing.Write the following propositions using p and q and logical connectives.
 - (a) It is below freezing and snowing.
 - (b) It is below freezing but not snowing.
 - (c) It is not below freezing and it is not snowing.
 - (d) It is below freezing, it is also snowing.

4. The notation for inequalities involves *and* and *or* statements. For instance, if x is a particular real number, then $x \leq 2$ means $x < 2$ or $x = 2$. Let p , q and r symbolize " $0 < x$ ", " $x < 3$ " and " $x = 3$ ", respectively. Write the following inequalities symbolically.
 - (a) $x \leq 3$
 - (b) $0 < x < 3$
 - (c) $0 < x \leq 3$

5. Write each of the following sentences symbolically, letting p = "It is hot" and q = "It is sunny".
 - (a) It is not hot but it is sunny.
 - (b) It is not both hot and sunny.
 - (c) It is neither hot nor sunny.