

## ASSIGNMENT: 2

Q.1 Use the truth tables method to determine whether  $(\neg p \vee q) \wedge (q \rightarrow \neg r \wedge \neg p) \wedge (p \vee r)$  (denoted with  $\phi$ ) is satisfiable or not? Please provide explanation for your answer.

Q.2 If  $p \rightarrow (q \vee r)$  is false, then the truth values of p, q, r are respectively

- |            |            |
|------------|------------|
| a. T, F, F | b. F, F, F |
| c. F, T, T | d. T, T, F |

Q.3 Use the truth table method to verify whether the following formulas are valid, satisfiable or unsatisfiable:

1.  $(p \rightarrow q) \wedge \neg q \rightarrow \neg p$

2.  $(p \vee q \rightarrow r) \vee p \vee q$

Q4. What is BNF grammar? In context with BNF following are few production rules: to define the term *calculation*:

```
calculation ::= <number><symbol><number>
number ::= <sign><real>|<real>|<sign><integer>|<integer>
integer ::= <digit>|<integer><digit>
real ::= <integer>.<integer>
digit ::= 0|1|2|3|4|5|6|7|8|9
symbol ::= +|-|*|/|^|**
sign ::= +|-
```

Which of the following is not a valid calculation according to the rules specified?

- |             |              |
|-------------|--------------|
| a. -23**3.5 | b. +23//3.5  |
| c. 23^+3.5  | d. 23.5++3.5 |

Q5. Given the premises " $p \rightarrow q$ " and " $q \rightarrow r$ ", does it entail " $p \rightarrow r$ "?

Q6. Consider the following statements:

1. p: It is raining outside.
2.  $\neg p$ : It is not raining outside.

Are the statements "p" and " $\neg p$ " consistent or inconsistent?

Q7. Consider the following premises:

All birds can fly. (For all x, if x is a bird, then x can fly.)  $(\forall x, \text{Bird}(x) \rightarrow \text{Fly}(x))$

Penguins are birds. ( $\text{Penguin}(p)$ )

Can we infer that penguins can fly?