

Assignment - 4

(1) Prove argument is valid using deduction

(a) $(p \wedge q) \vee (r \rightarrow s), r \rightarrow r, \sim(p \wedge q) \vdash r \rightarrow s$

(b) $p \rightarrow (q \vee r), (s \wedge t) \rightarrow q, (q \vee r) \rightarrow (s \wedge t) \vdash p \rightarrow q$

(c) $p \vee (q \rightarrow p), \sim p \wedge r \vdash \sim q$

(d) $p \rightarrow r, \sim p \rightarrow q, q \rightarrow s \vdash \sim r \rightarrow s$

(e) $(p \vee q) \rightarrow s, s \rightarrow r, \sim(r \vee q) \vdash \sim p$

(f) $p \wedge q, (p \wedge q) \rightarrow r \vdash \sim r$

(g) $p, (p \wedge \sim q) \rightarrow \sim p \vdash p \rightarrow q$

(h) $p, p \rightarrow q, q \rightarrow r \vdash r$

(i) $(p \wedge q) \rightarrow r, p \rightarrow q \vdash p \rightarrow ((p \wedge q) \wedge r)$

(j) $(p \vee q) \rightarrow \sim r, r \vee t, p \vdash t$

(k) $(p \wedge q) \rightarrow r, (r \rightarrow q), (r \rightarrow q) \rightarrow (q \wedge r) \vdash (p \wedge q) \rightarrow (q \wedge r)$

(2) Check the validity of following statement

(a) If 6 is even then 2 does not divide 7,
Either 5 is prime or 2 divides 7.

But 5 is prime, therefore 6 is odd

(b) If it rains then it will be cold,
If it is cold then I will stay at home.
Since it rains, therefore I shall stay at home.

(3) Let $K(x)$: x is a 2-wheeler, $S(x)$: x is a scooter,
 $M(x)$: x is manufactured by Bajaj. Express following

(i) Every 2-wheeler is a scooter

(ii) There is a 2-wheeler that is not manufactured by Bajaj

(iii) There is a 2-wheeler manufactured by Bajaj that is not a scooter.

(iv) Every 2-wheeler that is a scooter is manufactured by Bajaj.