Shri G.S. Institute of Technology and Science, Indore
Department of Computer Engineering
CO2453: Discrete Structures
Session: Jan.-May 2016

Instructor: Mahima Agrawal

Tutorial 02

State whether the following propositions are equivalent

1. (-p ^ (-q ^ r)) v (q ^ r) v (p ^ r) ≡ r
2. p → (q → p) ≡ ~p → (p → q)
3. p → (q v r) ≡ (p → q) v (p → r)
4. (p → q) ^ (r → q) ≡ (p v r) → q
5. [d → ((-a) ^ b) ^ c] ≡ -[(a v (-(b ^ c))) ^ d]
6. -(p v (-p ^ q)) ≡ -p ^ -q
7. (p → q) → r) ≡ p → (q → r)

Simplify using algebraic laws of proposition

1. (p ^ q) v p
2. (p ^ q) ^ -p
3. -(-p ^ q) ^ (-p vq) ^ (p v q)
4. (p v q) ^ -p
5. p v (p ^ q)
6. -(p v q) v (-p ^ q)
7. (p v q) ^ -p
8. -(p v q) v (-p v q)

Obtain the pcnf of the following

1. -p v q
2. (p ^ q) v (q ^ r)
3. (-p → r) ^ (q ↔ p), and hence find pdnf from pcnf.
4. (p ^ q) v (-p ^ q) v (p ^ -q)
5. (p ^ q) v (-p ^ q ^ r)
6. (-s ^ -p ^ r ^ q) v (s ^ p ^ -r ^ -q) v (-s ^ p ^ r ^ -q) v (q ^ -p ^ -r ^ s) v (p ^ -s ^ -r ^ q)
7. -(p v q)
8. -(p → q)
9. (p ^ q ^ r) v (-p ^ r ^ q) v (-p ^ -q ^ -r)
10. p v (-p → (q v (-q → r)))
11. p → (p ^ (q → p))
12. p → ((p → q) ^ - (-q v -p))

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Obtain the pdnf of the following

1. -p v q
2. (p ^ q) v (q ^ r)
3. p → ((p → q) ^ - (-q v -p))
4. -((p v q) ^ r) ^ (p v r)
5. p v (p ^ q) ≡ p
6. p v (-p ^ q) ≡ p v q
7. p v (-p → (q v (-q → r)))

Obtain the pdnf, pcnf for the following and which of the formulas are tautology

1. q ^ (p v -q)
2. (q → p) ^ (-p ^ q)