HW#1 - Solution

1.

(a) Q(0,0,0) ∧ Q(0,1,0)

(b) Q(0,1,1) ∨ Q(1,1,1) ∨ Q(2,1,1)

(c) ㄱQ(0,0,0) ∨ ㄱQ(0,0,1) 또는 ㄱ(Q(0,0,0) ∧ Q(0,0,1))

(d) ㄱQ(0,0,1) ∨ ㄱQ(1,0,1) ∨ ㄱQ(2,0,1) 또는 ㄱ(Q(0,0,1) ∧Q(1,0,1) ∧Q(2,0,1))

2.

(a) For every integer n, there is a integer m such that $n^2 < m$ ∴True

(b) For every integer n, there is a integer m such that n+m=0 ∴True

(c) There is an integer n and integer m such that n+m=4 and n-m=2 ∴True (unique)

(d) There is an integer n for every integer m such that nm = 2 ∴True (unique)

3.

(a) DNF : (Q∧P) ∨(Q∧ㄱQ) / CNF : (Q) ∧(P∨ㄱQ)

PDNF : $\sum 3$ / PCNF : $\prod 0,1,2$

(b) DNF : (ㄱQ∧Q∧P) ∨ (P∧ㄱP∧Q) / CNF : (ㄱQ∨P) ∧ (ㄱP) ∧ (Q)

PDNF : False or nil / PCNF : $\prod 0,1,2,3$

4. (a) Assume ㄱQ → ㄱP (n is odd → $n^3 + 5$ is even). Let n = 2k+1, then we can easily show that this conditional statement is true. So, by contrapositive rule, P→Q is true.

(b) P→Q is equivalent to (P∧ㄱQ)→False. So, assume 'n is odd' and '$n^3 + 5$ is odd'. Then we can easily get contradiction. So, P→Q is true.