Maths assignment 3

Q1 $\overline{X \cap Y}$ →

A \ B		
	1	1
1	1	0

$A \cap B =$

A \ B		
	0	0
0	0	1

$\bar{A} \cap B$

A \ B		
	1	1
1	1	0

$(A \bar{\cap} B) \bar{\cap} (A \bar{\cap} B)$ =

A \ B		
	0	0
0	0	1

True

(b) $A \cup B$ →

	0	1
1	1	

$(A \bar{\cap} A) \bar{\cap} (B \bar{\cap} B)$

→ $\bar{A} \bar{\cap} \bar{B}$ →

A \ B		
	1	0
0	0	0

True

$\overline{A \cap B}$ →

A \ B		
	0	1
1	1	1

(c) $\underline{A \bar{\cap} (B \bar{\cap} C)}$ $A \cap (\overline{B \bar{\cap} C})$

$\overline{A \cap (B \cap C)}$

A \ B \ C				
	0	0	0	0
1	1	1	0	1

$\overline{A \cap (B \cap C)}$

A \ B \ C				
	1	1	0	0
1	1	1	1	0

False

Q2 $\overline{A \cup B} = 24$

$A \cap B \cap C = 20$

$(A \cap C) / B = 8$

$C = 60$

$\overline{A \cup C} = 12$

$\underline{A \cup B \cup C} = 120$

$\overline{B \cup C} = 8$

		C		
		0	12	8	24
A	8	64	20	8
		B		

$60 - 34 - 20 - 8 = 8$

120

a) 64

b) 100

Q3)a) 1) $(P - q) \rightarrow P$

P q	$(P \rightarrow q)$		$\rightarrow$	P
F F	F	T	F	T	F
F T	F	T	T	F	F
T F	T	F	F	T	T
T T	T	T	T	T	T

nds a tautology

(1)

p	q	r	(p ∧ (q ≡ r))	→	((p ∧ q) ≡ (p ∧ r))
F	F	F	F F F T F	T	F F F T F F F
F	F	T	F F F F T	T	F F F T F F T
F	T	F	F F T F F	T	F F T T F F F
F	T	T	F F T T T	T	F F T T F F T
T	F	F	T T F F F	T	T F F T F F F
T	F	T	T F F F T	T	T F F F T T T
T	T	F	T F T F F	T	T T T F T F F
T	T	T	T T T T T	T	T T T T T T T

Tautology

b P: Programmer is careful
S: Specification is clear
C: Program crashes

P_1: $((P \vee C) \rightarrow \neg S)$

P_2: $P \rightarrow \neg C$

P_3: C

P_4: $S \rightarrow P$

$P_1 \wedge P_2 \wedge P_3 \rightarrow P_4$

$\rightarrow ((P \vee C) \rightarrow \neg S) \wedge (P \rightarrow \neg C) \wedge (S \rightarrow P)$

P	S	C	P ∨ (C → ¬S)	∧	(P → ¬C)	∧	C	→	(S → P)
F	F	F	F T F T T	T	F T T	F	F	T	F T F
F	F	T	F T T T T	T	F T F	T	T	T	F T F
F	T	F	F T F T F	T	F T T	F	F	T	T F F
F	T	T	F F T F F	F	F T F	F	T	T	T F F
T	F	F	T T F T T	T	T T T	F	F	T	F T T
T	F	T	T T T T T	F	T F F	F	T	T	F T T
T	T	F	T T F T F	T	T T T	F	F	T	T T T
T	T	T	T T F F F	F	T F F	F	T	T	T T T

Arguement is valid