Задание 1 ДНФ, КНФ, СКНФ и СДНФ

P	R	Q	P → R	R → Q	P → (R → Q)	[P → (R → Q) → (P → R)]	A	$\bar{A}$
0	0	0	1	1	1	1	1	0
0	0	1	1	1	1	1	1	0
0	1	0	1	0	1	1	1	0
0	1	1	1	1	1	1	1	0
1	0	0	0	1	1	0	1	0
1	0	1	0	1	1	0	1	0
1	1	0	1	0	0	1	1	0
1	1	1	1	1	1	1	1	0

а) $(P \to R) \to ((P \to (R \to a)) \to (P \to R))$

СДНФ(А) = $\overline{PRQ} \vee \overline{PR}Q \vee \overline{PQ}R \vee \bar{P}RQ \vee P\overline{RQ} \vee P\bar{R}R \vee PR\bar{Q} \vee PRQ$

СКНФ(А) нет

б) $((P \sim Q) \wedge \bar{P}) \to \bar{Q}$

P	Q	$\bar{P}$	$\bar{Q}$	P~Q	$((P \sim Q) \wedge \bar{P})$	B	$\bar{B}$
0	0	1	1	1	1	1	0
0	1	1	0	0	0	1	0
1	0	0	1	0	0	1	0
1	1	0	0	1	0	1	0

СДНФ(В) = $\overline{PQ} \vee \bar{P}Q \vee P\bar{Q} \vee PQ$

СКНФ(В) нет

в) $(\bar{X} \to \bar{Y}) \sim (\bar{Y} \sim Z)$

X	Y	Z	$\bar{X}$	$\bar{Y}$	$\bar{X} \to \bar{Y}$	Y~Z	C	$\bar{C}$
0	0	0	1	1	1	1	**1**	**0**
0	0	1	1	1	1	0	**0**	**1**
0	1	0	1	0	0	0	**1**	**0**
0	1	1	1	0	0	1	**0**	**1**
1	0	0	0	1	1	1	**1**	**0**
1	0	1	0	1	1	0	**0**	**1**
1	1	0	0	0	1	0	**0**	**1**
1	1	1	0	0	1	1	**1**	**0**

СДНФ(C) = $\overline{XYZ} \vee \bar{P}Y\bar{Z} \vee X\overline{YZ} \vee XYZ$

СКНФ(C) = $\overline{СДНФ(\overline{C})} = \overline{\bar{x}\bar{y}z \vee \bar{x}y\bar{z} \vee x\bar{y}z \vee xy\bar{z}} = (x \vee y \vee \bar{z})(x \vee \bar{y} \vee z)(\bar{x} \vee y \vee \bar{z})(\bar{x} \vee \bar{y} \vee z)$

2) $(\bar{X} \to \bar{Y}) \to ((Y \wedge Z) \to (X \wedge Z))$

X	Y	Z	$\bar{X}$	$\bar{Y}$	$\bar{X} \to \bar{Y}$	Y∧Z	X∧Z	(Y∧Z)→(X∧Z)	D	$\bar{D}$
0	0	0	1	1	1	0	0	1	**1**	**0**
0	0	1	1	1	1	0	0	1	**1**	**0**
0	1	0	1	0	0	0	0	1	**1**	**0**
0	1	1	1	0	0	1	0	0	**1**	**0**
1	0	0	0	1	1	0	0	1	**1**	**0**
1	0	1	0	1	1	0	1	1	**1**	**0**
1	1	0	0	0	1	0	0	1	**1**	**0**
1	1	1	0	0	1	1	1	1	**1**	**0**

СДНФ(D) = $\overline{XYZ} \vee \overline{XY}Z \vee \overline{XZ}Y \vee \bar{X}YZ \vee X\overline{YZ} \vee X\bar{Y}Z \vee XY\bar{Z} \vee XYZ$

СКНФ (D) нет

Задание 2.

а) $\overline{(A \vee B)}(\bar{A} \vee \bar{B}$

СКНФ(D) нет

$$\overline{(A \vee B)}(\bar{A} \vee \bar{B}) = (\bar{A} \wedge \bar{B})(\bar{A} \vee \bar{B})$$

A	B	$\bar{A}$	$\bar{B}$	$\bar{A} \wedge \bar{B}$	$\bar{A} \vee \bar{B}$	E	$\bar{E}$
0	0	1	1	1	1	**1**	**0**
0	1	1	0	0	1	**0**	**1**
1	0	0	1	0	1	**0**	**1**
1	1	0	0	0	0	**0**	**1**

СДНФ(E) = $\overline{AB}$

СКНФ(E) = $\overline{СДНФ(\overline{E})} = \overline{(\bar{A}B) \vee (A\bar{B}) \vee (AB)} = (A \vee \bar{B})(\bar{A} \vee B)(\bar{A} \vee \bar{B})$

б) $(A \to \bar{B})(A \to C)$

A	B	C	$\bar{B}$	$A \to \bar{B}$	$A \to C$	F	$\bar{F}$
0	0	0	1	1	1	**1**	**0**
0	0	1	1	1	1	**1**	**0**
0	1	0	0	1	1	**1**	**0**
0	1	1	0	1	1	**1**	**0**
1	0	0	1	1	0	**0**	**1**
1	0	1	1	1	1	**1**	**0**
1	1	0	0	0	0	**0**	**1**
1	1	1	0	0	1	**1**	**0**

СДНФ(F) = $\overline{ABC} \vee \overline{AB}C \vee \overline{AC}B \vee \bar{A}BC \vee A\bar{B}C \vee ABC$

СКНФ(F) = $\overline{СДНФ(\overline{F})} = \overline{(A\bar{B}\bar{C}) \vee (AB\bar{C})} = (\bar{A} \vee B \vee C)(\bar{A} \vee \bar{B} \vee C)$

8) $(A \to B)(B \to A)(A \vee B)$

A	B	A → B	B → A	(A ∨ B)	(A → B)(B → A)	G	$\bar{G}$
0	0	1	1	0	1	**0**	**1**
0	1	1	0	1	0	**0**	**1**
0	1	1	1	1	0	**0**	**1**
1	0	0	1	1	1	**1**	**0**
1	1	1	1	1			

СДНФ(G) = $A\bar{B}$

СКНФ(G) = $\overline{СДНФ(\bar{G})} = \overline{(\bar{A}\bar{B}) \vee (\bar{A}B) \vee (A\bar{B})} = (A \vee B)(A \vee \bar{B})(\bar{A} \vee B)$

2) $\overline{(A \to B)(B \to \bar{A})}$

A	B	$\bar{A}$	A → B	B → $\bar{A}$	(A → B)(B → $\bar{A}$)	H	$\bar{H}$
0	0	1	1	1	1	**0**	**1**
0	1	1	1	1	1	**0**	**1**
0	1	1	1	1	0	**1**	**0**
1	0	0	0	1	0	**1**	**0**
1	1	0	1	0			

СДНФ(H) = $\overline{A\bar{B}} \vee \bar{A}B$

СКНФ(H) = $\overline{СДНФ(\bar{E})} = \overline{(A\bar{B}) \vee (AB)} = (\bar{A} \vee B)(\bar{A} \vee \bar{B})$

g) $(P \to \bar{Q})(P \to R)$

P	R	$\bar{Q}$	P → $\bar{Q}$	P → R	A	$\bar{A}$
0	0	1	1	1	**1**	**0**
0	0	0	1	1	**1**	**0**
0	1	1	1	1	**1**	**0**
0	1	0	1	1	**1**	**0**
1	0	1	1	0	**0**	**1**
1	0	0	0	0	**0**	**1**
1	1	1	1	1	**1**	**0**
1	1	0	0	1	**0**	**1**

СДНФ(H) = $\overline{P\bar{R}Q} \vee \overline{PRQ} \vee \bar{P}RQ \vee \bar{P}R\bar{Q} \vee PRQ$

СКНФ(H) = $\overline{СДНФ(\bar{E})} = \overline{(P\bar{R}Q) \vee (P\bar{R}\bar{Q}) \vee (PR\bar{Q})} = (\bar{P} \vee R \vee \bar{Q})(\bar{P} \vee R \vee Q)(\bar{P} \vee \bar{R} \vee Q)$

e) $(P \sim Q) \to (P \wedge R)$

P	R	Q	P~Q	P ∧ R	A	$\bar{A}$
0	0	0	1	0	**0**	**1**
0	0	1	0	0	**1**	**0**
0	1	0	1	0	**0**	**1**
0	1	1	0	0	**1**	**0**
1	0	0	0	0	**1**	**0**
1	0	1	1	0	**0**	**1**
1	1	0	0	1	**1**	**0**
1	1	1	1	1	**1**	**0**

СДНФ(Н) = $\overline{PR}Q \vee \bar{P}RQ \vee P\overline{RQ} \vee PR\bar{Q} \vee PRQ$

СКНФ(Н) = $\overline{СДНФ(\overline{E})} = \overline{(\bar{P}\bar{R}\bar{Q})v(\bar{P}R\bar{Q}) \vee (P\bar{R}Q)} = (P \vee R \vee Q)(P \vee \bar{R} \vee Q)(\bar{P} \vee R \vee \bar{Q})$