# Quiz 4 10/30/24

1. $A \uparrow A = \bar{A}$

$(A \uparrow B) \uparrow (A \uparrow B) = AB$

$AB \uparrow AB = (A \uparrow A) \uparrow (B \uparrow B) = A + B$

$\bar{A} \uparrow (AB \uparrow AB) = A$

$\bar{A} \uparrow (A + B) = A$

$\bar{A} \uparrow (A) = A$

$A = A$

2. $\overline{(A \uparrow A) \downarrow (B \uparrow B)} \equiv (\bar{A} \downarrow \bar{A}) \uparrow (\bar{B} \downarrow \bar{B})$

$\overline{A \uparrow A} = A$ $\quad \overline{B \uparrow B} = B$ $\quad \bar{A} \downarrow \bar{A} = A$ $\quad \bar{B} \downarrow \bar{B} = B$

$A \downarrow B \equiv A \uparrow B$

3.

| A | B | $f_1$ $A\bar{B}$ | $f_2$ $\bar{A}\bar{B}$ | $f_3$ $\bar{A}B$ | $f_4$ $\bar{A}\bar{B}$ | $(AB)+(\bar{A}B)+(\bar{A}\bar{B})$ | $A \Rightarrow B$ |
|---|---|---|---|---|---|---|---|
| T | T | T | F | F | F | T | T |
| T | F | F | T | F | F | F | F |
| F | T | F | F | T | F | T | T |
| F | F | F | F | F | T | T | T |

4.

| A | B | $\bar{A}$ | $\bar{B}$ | $\bar{A}+B$ | $\bar{B}+A$ |
|---|---|---|---|---|---|
| T | T | F | F | T | T |
| T | F | F | T | F | T |
| F | T | T | F | T | F |
| F | F | T | T | T | T |

$\bar{A}+B = A \Rightarrow B$

$\bar{B}+A = B \Rightarrow A$

5. $\overline{C(A+B)} \equiv \bar{C} + \bar{A}\bar{B}$

6.

| A | B | $\bar{A}$ | $\bar{B}$ | $AB$ | $\overline{AB}$ | $\bar{A}\bar{B}$ |
|---|---|---|---|---|---|---|
| T | T | F | F | T | F | F |
| T | F | F | T | F | T | F |
| F | T | T | F | F | T | F |
| F | F | T | T | F | T | T |

$\overline{AB} \neq \bar{A}\bar{B}$

7.

| A | B | $A+B$ | $\bar{A}$ | $\bar{B}$ | $\overline{A+B}$ | $\bar{A}+\bar{B}$ |
|---|---|---|---|---|---|---|
| T | T | T | F | F | F | F |
| T | F | T | F | T | F | T |
| F | T | T | T | F | F | T |
| F | F | F | T | T | T | T |

$\overline{A+B} \neq \bar{A}+\bar{B}$