Datenbanken – 1

1)

a	b	¬a	¬b	¬a ∨ b	(a ∧ ¬b),	¬(a ∧¬b)	a ⇒ b
0	0	1	1	1	0	1	1
0	1	1	0	1	0	1	1
1	0	0	1	0	1	0	0
1	1	0	0	1	0	1	1

→ alle 3 Ausdrücke sind gleichwertig

2)
a)
$x \in A \cup B \iff x \in A$ oder $x \in B$
also $\varphi(x) \iff (x \in A \vee x \in B)$
$A \cup B := \{x \mid x \in A \vee x \in B\}$

$x \in A \setminus B \iff x \in A$ und $x \notin B$
also $\varphi(x) \iff (x \in A \vee x \notin B)$
$A \setminus B := \{x \mid x \in A \wedge x \notin B\}$

$x \in \emptyset \iff x \neq x$
also $\varphi(x) \iff (x \neq x)$
$\emptyset := \{x \mid x \neq x\}$

b) $\varphi(x)$ ist eine Komprehensionsformel von x bedeutet: $x \in M \iff \varphi(x)$
also: $\varphi(x) \iff (x \in M)$
$M := \{x \mid x \in \varphi(x)\}$

3)
a)
{(3, e, A,2, c), (3, e, A,2, d),(3, f, B,2, c), (3, f, B,2, d)}
b)
$(R_1 \times R_2) =$ {(1, a,2, c), (1, a,2, d),(1, b,2, c), (1, b,2, d)}
$(R_1 \times R_2) \times R_3 =$ {(1, a,2, c ,3, e, A), (1, a,2, c ,3, f, B),(1, a,2, d ,3, e, A), (1, a,2, d ,3, f, B),
(1, b,2, c ,3, e, A), (1, b,2, c ,3, f, B),(1, b,2, d ,3, e, A), (1, b,2, d ,3, f, B)}
c)
$R_2 \times R_3 =$ {(2, c,3, e, A), (2, c,3, f, B),(2, d,3, e, A), (2, d,3, f, B)}
$R_1 \times (R_2 \times R_3) =$ {(1, a,2, c,3, e, A), (1, a,2, c,3, f, B),(1, a2, d,3, e, A), (1, a,2, d,3, f, B),
(1, b,2, c,3, e, A), (1, b,2, c,3, f, B),(1, b,2, d,3, e, A), (1, b,2, d,3, f, B),}
d)
$R_2 \times R_3 =$ {(2, c,3, e, A), (2, c,3, f, B),(2, d,3, e, A), (2, d,3, f, B)}
$(R_2 \times R_3) \times R_1 =$ {(2, c,3, e, A ,1, a), (2, c,3, e, A ,1, b),
(2, c,3, f, B ,1, a), (2, c,3, f, B ,1, b),
(2, d,3, e, A ,1, a), (2, d,3, e, A ,1, b),
(2, d,3, f, B ,1, a), (2, d,3, f, B ,1, b)}

4)
a)
$A = \{1,2\}$ $B = \{2,3\}$ $C = \{3\}$
$A \cup B = \{1,2,3\}$ $A \cup C = \{1,2,3\} \implies A \cup B = A \cup C$, aber $B \neq C$
b)
R = {(1),(2)} P = {(a, b),(c, d)}
R × P = {(1,a, b),(1,c, d),(2,a, b),(2,c, d)}
P × R = {(a, b ,1),(a, b ,2),(c, d,1),(c, d, 2)}
$\implies$ R × P ≠ P × R , da Tupel geordnet sind und (1,a, b) ≠ (a, b ,1)