Section 1-6: Logical Equivalence

Exercises

Give the truth tables for the following logical expressions.

1. $p \wedge \overline{p}$
2. $p \vee 1$
3. $p \wedge \overline{q}$
4. $\overline{p \vee q}$
5. $p \oplus \overline{q}$
6. $p \vee (\overline{p} \wedge q)$
7. $(p \vee q) \wedge r$
8. $p \vee q \vee \overline{r}$
9. $(p \wedge q) \vee \overline{p \vee \overline{q}}$
10. $(\overline{p} \vee \overline{q}) \wedge (\overline{p} \vee q)$

Are the two expressions logically equivalent?

11. $\overline{p \wedge q}$ and $\overline{p} \wedge \overline{q}$
12. $\overline{p \vee q}$ and $\overline{p} \wedge \overline{q}$
13. $p \oplus q$ and $\overline{p} \oplus \overline{q}$
14. $p \vee (q \wedge r)$ and $(p \vee q) \wedge r$
15. $p \vee (p \wedge q)$ and p
16. $(p \vee q) \vee r$ and $p \vee (q \vee r)$
17. $p \oplus q$ and $(p \wedge q) \vee (\overline{p} \wedge \overline{q})$

Simplify.

18. $p \wedge p$
19. $p \vee \overline{p}$
20. $p \wedge 0$
21. $\overline{p} \oplus p$
22. $(p \oplus q) \wedge (p \oplus \overline{q})$
23. $p \vee (p \wedge q)$
24. $q \wedge (p \vee q)$

25. (tricksy) $p \wedge (\bar{p} \vee q)$

26. (tricksy) $p \vee (\bar{p} \wedge q)$