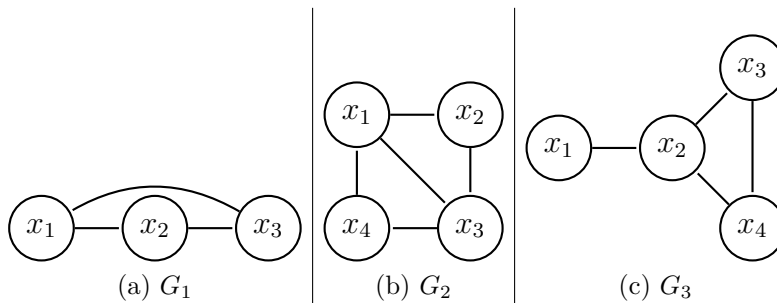


I Graphs

Exercise I

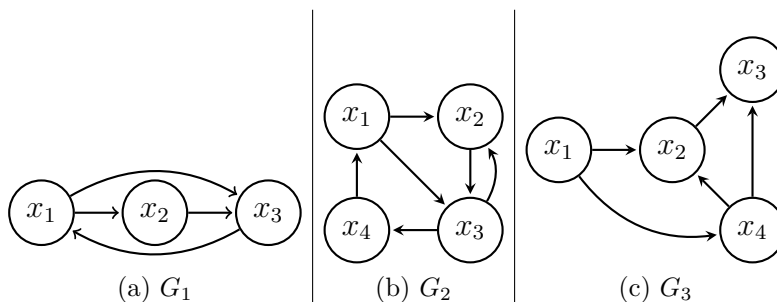
Let G_1, G_2, G_3 be the following graphs : For each of these graphs, answer the following questions :



- Give all the chains between x_1 and x_3 .
 - Give all the cycles.
 - Give all the cliques.
- Give the subgraph induced by $\{x_1, x_2, x_3\}$.

Exercise II

Let G_1, G_2, G_3 be the following graphs : For each of these graphs, answer the following questions :



- Give all the paths from x_1 to x_3 .
 - Give all the cycles.
 - Give all the cliques.
- Give the subgraph induced by $\{x_1, x_2, x_3\}$.

II Logic

Exercise III

Which of these formulas are well-formed? For those which are not well-formed, why?

- $\varphi_1 = x$

2. $\varphi_2 = x \wedge (y \vee)$
3. $\varphi_3 = x \wedge (y \vee z)$
4. $\varphi_4 \Rightarrow a$
5. $\varphi_5 = (a \vee x) \wedge (c \vee \neg(d \wedge \neg p))$
6. $\varphi_6 = (p \vee q) \Rightarrow (a \wedge \neg)$
7. $\varphi_7 = x \vee (y \wedge) \vee z$
8. $\varphi_8 = a \Rightarrow (\neg b \wedge \neg b \wedge \neg c)$
9. $\varphi_9 = a \Leftrightarrow \neg a$
10. $\varphi_{10} = x \vee (a \wedge (b \Leftrightarrow (c \Rightarrow (d \Rightarrow e))))$
11. $\varphi_{11} = \neg(a \wedge (c \vee x))$
12. $\varphi_{12} = \neg(a \Leftrightarrow (\wedge d))$

Exercise IV

For each of these formulas, is it a CNF formula, a DNF formula, or neither of them?

1. $\varphi_1 = (x \vee \neg y \wedge z) \wedge (\neg x \vee p)$
2. $\varphi_2 = \neg(x \vee \neg y) \wedge (t \vee \neg z)$
3. $\varphi_3 = (p \wedge q \wedge \neg r) \vee (a \wedge \neg b \wedge \neg c)$
4. $\varphi_4 = (\neg a \vee c) \wedge (a \vee b)$
5. $\varphi_5 = (\neg a \vee b \vee c) \wedge (\neg b \vee a)$
6. $\varphi_6 = (a \wedge \neg b) \vee (c \wedge \neg d)$
7. $\varphi_7 = (x \wedge \neg x) \vee (\neg y \wedge y)$
8. $\varphi_8 = (t \vee u \vee \neg v) \wedge (a \vee b) \wedge c$
9. $\varphi_9 = a \wedge b \wedge c$
10. $\varphi_{10} = a \vee b \vee c$
11. $\varphi_{11} = \neg(a \wedge b \wedge c)$
12. $\varphi_{12} = a \vee \neg c \vee (x \wedge y)$

Exercise V

For each of these pairs of formulas and interpretations, is the interpretation a model of the formula?

1. $\varphi_1 = (x \vee \neg y \vee z) \wedge (\neg x \vee p)$ and $\omega_1 = \{x, y\}$
2. $\varphi_2 = \neg(x \vee \neg y) \wedge (t \vee \neg z)$ and $\omega_2 = \{x, t\}$
3. $\varphi_3 = (p \wedge q \wedge \neg r) \vee (a \wedge \neg b \wedge \neg c)$ and $\omega_3 = \{p, q, r\}$

4. $\varphi_4 = (\neg a \vee c) \wedge (a \vee b)$ and $\omega_4 = \{a, b\}$
5. $\varphi_5 = (\neg a \vee b \vee c) \wedge (\neg b \vee a)$ and $\omega_5 = \{a\}$
6. $\varphi_6 = (a \wedge \neg b) \vee (c \wedge \neg d)$ and $\omega_6 = \{a, d\}$
7. $\varphi_7 = (x \wedge \neg x) \vee (y \wedge \neg y)$ and $\omega_7 = \emptyset$
8. $\varphi_8 = (t \vee u \vee \neg v) \wedge (a \vee b) \wedge c$ and $\omega_8 = \{b, c\}$