Guided Tutorials n°1

Exercise 1

Compute the truth table and determine the class of the following statements (i.e., validity, satisfiability, unsatisfiability, or contingency):

1. smoke $\Rightarrow$ smoke
2. smoke $\Rightarrow$ fire
3. (smoke $\Rightarrow$ fire)$\Rightarrow$(smoke $\Rightarrow \neg$fire)
4. smoke $\vee$ fire $\vee \neg$fire
5. ((smoke $\wedge$ heat) $\Rightarrow$ fire) $\Leftrightarrow$ ((smoke $\Rightarrow$ fire) $\vee$ (heat $\Rightarrow$ fire))
6. (smoke $\Rightarrow$ fire)$\Rightarrow$((smoke $\wedge$ heat)$\Rightarrow$ fire)
7. big $\vee$ mute $\vee$ (big $\Rightarrow$ mute)
8. (big $\wedge$ mute) $\vee \neg$mute
9. ((mute $\wedge$ big) $\Rightarrow \neg$big) $\Rightarrow \neg$mute)

Exercise 2

Are the following logical consequences verified ? (Compute the truth table)

1. $\{(p \vee q), (p \Rightarrow r)\} \models (r \wedge q)$
2. $\{(p \vee q \vee s), (s \Rightarrow p), (p \Rightarrow q)\} \models q$

Exercise 3

Model the following statements in propositional logic:

1. To open this door, you need either a key or a knife
2. A triangle is equilateral if and only if it is isosceles.
3. Two lines cannot be both intersecting and parallel
4. a teacher works for at least nine hours unless he has a high-rank.