

N° 4.

Translate the following sentences into predicate logic (providing in each case the interpretation of non logical constants —e.g. $L(x, y) = x$ loves y). In case of ambiguity, give as many formulae as necessary.

- (7)
- a. Everybody is upset as soon as someone makes noise.
 - b. A shopkeeper only survives if he has clients.
 - c. Eveyone passed the exam, except those who didn't show up.
 - d. Nobody hates the entire world.
 - e. All children are disappointed when an adult lies to them.
 - f. If everybody loves her, Marie loves everybody.
 - g. Marie loves everyone who loves her.
 - h. If João goes to Tahiti and he meets someone, he will marry her.

N° 5. Soit $M = \langle U, I \rangle$ le modèle suivant : $U = \{\text{Alain, Béatrice, Christine, David}\}$.
 $I(a) = \text{Alain}$; $I(b) = \text{Béatrice}$; $I(c) = \text{Christine}$; $I(d) = \text{David}$
 $I(H) = \{\text{Alain, David}\}$; $I(F) = \{\text{Christine, Béatrice}\}$
 $I(A) = \{\langle \text{Alain, Christine} \rangle, \langle \text{David, Béatrice} \rangle, \langle \text{Alain, David} \rangle\}$
 $I(D) = \{\langle \text{Christine, David} \rangle, \langle \text{Alain, Béatrice} \rangle, \langle \text{David, Béatrice} \rangle, \langle \text{Christine, Alain} \rangle\}$

a. Évaluez la valeur de vérité des formules suivantes dans ce modèle :

- a. $D(d, b)$
- b. $H(d) \wedge D(c, d)$
- c. $D(d, b) \rightarrow F(a)$
- d. $H(c) \wedge (H(a) \rightarrow D(a, c))$

b. Construisez le modèle $M' = \langle D, I' \rangle$, tel que (i) M' a le même domaine d'individus que M , (ii) I' associe la même dénotation que I aux constantes d'individus, et (iii) les formules suivantes sont vraies dans M' :

- a. $H(c) \wedge H(a)$
- b. $\forall x (H(x) \rightarrow A(x, c))$
- c. $A(a, c) \rightarrow D(c, a)$
- d. $\exists x \exists y ((H(x) \wedge F(y) \wedge A(x, y)) \vee (H(x) \wedge F(y) \wedge A(y, x)))$

N° 6. Russel proposed to represent presupposed and asserted contents at the same level. For instance, for *It's Marcel who is guilty*. we would get the formula $\exists x G(x) \wedge G(m)$ (Someone is guilty and Marcel is guilty). Similarly for *The king of France is bald*, we would have ¹ $\exists x R d F(x) \wedge \forall y (R d F(y) \rightarrow y = x) \wedge B(x)$.

Propose a representation in the same spirit for the following utterances.

- (8)
- a. Jean aussi est venu
 - b. Léa a réussi son ascension
 - c. Seul le facteur est passé
 - d. Paul s'est fait voler sa voiture

¹Adding equality to the first order language is necessary to express formally unicity.