Assignment 2

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Answer 1.1

$$N_C = \{ \text{person, company, staff, customer,}$$
$$\text{StaffMember, Salesperson, boss, company, product} \}$$

$$N_R = \{ \text{worksfor, sells, ServedBy, BuyFrom} \}$$

$$N_O = \{ \text{Anna, Barbara, Carl, David, Edna, Car} \}$$

Answer 1.2

$$T_{Box} = \text{person} \sqsubseteq (\text{Staff Member} \sqcup \text{customer}),$$

$$(\text{Salesperson} \sqcup \text{boss}) \sqsubseteq \text{Company Staff},$$

$$\text{Salesperson} \sqsubseteq \forall \text{worksfor. Boss},$$

$$\text{Custorm} \sqsubseteq \exists \text{ServedBy. StaffMember},$$

$$\text{Salesperson} \sqsubseteq \exists \text{sells. Product},$$

$$\text{Boss} \sqsubseteq \gamma \forall \text{worksfor. T}$$

$$\text{Customer} \sqsubseteq \exists \text{servedby. StaffMember} \sqcap \exists \text{buyfrom. Salesperson}$$

Answer 1.3

$$A_{Box} = \{ \begin{array}{l} \text{Barbara: Salesperson,} \\ \text{Carl : Salesperson,} \\ \text{David: customer,} \\ (\text{David, Barbara}): \text{ServedBy,} \\ (\text{Barbara, Anna}): \text{worksfor} \\ (\text{Carl, Anna}): \text{worksfor} \\ (\text{Edna, Car}): \text{sells} \end{array} \}$$

Answer 2.2

1. $\text{Staff Member} \sqsubseteq (\text{Nurse} \sqcup \text{Physician} \sqcup \text{Janitor})$

2.

3. $\text{Patient} \sqsubseteq \text{Person} \sqcap \exists \text{getsTreatedfor. ILLNESS}$

4. $\text{Nurse} \sqsubseteq \text{Person} \sqcap \exists \text{TakesCareof. Patient}$

5. $\text{Janitor} \sqsubseteq \neg (\exists_{\text{TakeCareOf}} . \text{Patient})$

6. $\forall_{\text{canTreatIllness}} \sqsubseteq \text{Physician}$

Answer 2-1

a) $\boxed{\text{Nurse} \sqsubseteq \forall_{\text{takes Care of}} . \text{Patient}}$

Violates   Statement (4)

- because in Statement (4) tells existential relationship with patient while in rule Universal relationship is used

- A Nurse can take care of one patient, so it will violate Rule 1, as it says that Nurse should take care of all the patients, however the model statisfies Statement (4)

b) $\neg \exists_{\text{takes Care of}} . \text{Patient} \sqsubseteq \text{Janitor},$

Violates   Statement (5),

A physician does not take care of all the patients, and we know that Physician is not a Janitor,

∴ it violates Rule No 2

Ans 2.3