Semantic Theory 2017: Exercise sheet 2

Exercise 1

1.1 Derive the types of the underlined expressions in the following sentences. The subscripts indicate the types of the relevant expressions. Also provide the (simplified) logical form you derived for each sentence.

a. [Darth Vader]$_e$ is [<u>the father of</u> Luke$_e$].

b. <u>Every</u> Jedi$_{\langle e,t\rangle}$ has [a lightsaber]$_e$.

c. [Padmé Amidala]$_e$ is the [<u>most</u> beautiful] woman$_{\langle e,t\rangle}$ on Naboo$_e$.

1.2 Is it possible to have two type theoretic expressions A and B such that both $A(B)$ and $B(A)$ are well-formed? Motivate your claim.

Exercise 2

The diagram graphically represents a model structure $M = \langle U, V\rangle$ with a universe consisting of three entities. The green circle indicates the set of Jedi, the arrow indicates the helping relation.

M:
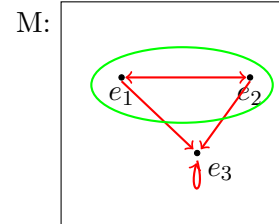
2.1 Give the denotation of the interpretation function V_M for the following non-logical constants:

a. anakin', yoda', padmé' $\in$ CON$_e$

b. jedi' $\in$ CON$_{\langle e,t\rangle}$

c. help' $\in$ CON$_{\langle e,\langle e,t\rangle\rangle}$

2.2 Compute the denotations of the following expressions relative to the model structure M and some arbitrary variable assignment g. Here, x is a variable of type e, and F is a variable of type $\langle e, t\rangle$.

a. $[\![\textit{help'(padmé')}]\!]^{M,g} = ?$

b. $[\![\forall x(\textit{help'}(x)(x) \rightarrow \neg\textit{jedi'}(x))]\!]^{M,g} = ?$

c. $[\![\forall F\exists x(F(x))]\!]^{M,g} = ?$