Assignment2 – Fragment 1

Problem 2.1

Consider the following *sentence*:

It is not the case that Prudence is the dog and Ethel howled.

1. How would the *sentence* be *parsed* according to the grammar of *Fragment* 1?
2. Apply the *translation rules/semantics construction* from *Fragment* 1 to the *sentence*.

Problem 2.2

Extend a) the *grammar* and b) the *translation rules* of *Fragment* 1 to include more *sentences*. Concretely, with your extension the *grammar* of *fragment* 1 should *accept sentences* like

Prudence isn't the dog. If Ethel isn't crazy, then Prudence is the dog.

Problem 2.3 (PLNQ Semantics)

Consider the *first-order signature*

$$\Sigma_0^f = \{o\} \tag{1}$$

$$\Sigma_1^f = \{s\} \tag{2}$$

$$\Sigma_1^p = \{p, z\} \tag{3}$$

and the following PL^{nq} *formula*

$$\varphi := p(s(o)) \wedge \neg z(o)$$

1. *Evaluate* φ using the *model* $\langle \mathcal{D}, \mathcal{I} \rangle$ with

$$\mathcal{D} = \{\blacksquare, \blacklozenge, \star\} \tag{4}$$

$$\mathcal{I}(o) = \blacklozenge \tag{5}$$

$$\mathcal{I}(s) = \{\blacksquare \mapsto \blacklozenge, \blacklozenge \mapsto \blacksquare, \star \mapsto \star\} \tag{6}$$

$$\mathcal{I}(p) = \{\blacksquare, \star\} \tag{7}$$

$$\mathcal{I}(z) = \{\blacksquare, \star\} \tag{8}$$

2. *Evaluate* φ using the *model* with:

$$\mathcal{D} = \{0, 1, 2, 3, ...\} \tag{9}$$

$$\mathcal{I}(o) = 0 \tag{10}$$

$$\mathcal{I}(s) = \{0 \mapsto 1, 1 \mapsto 2, 2 \mapsto 3, ...\} \tag{11}$$

$$\mathcal{I}(p) = \{1, 2, 3, ...\} \tag{12}$$

$$\mathcal{I}(z) = \{0\} \tag{13}$$

In other words, the *domain* is the *natural numbers*, *o* is *interpreted* as 0, *s* is *interpreted* as the *successor function*, *p* is *interpreted* as the *set* of all *positive integers*, and *z* is *interpreted* as the *set* containing only 0.