

Question 1.1

1. MGUs

- (a) $T1 = [T3 \rightarrow T4]$
 $T2 = \text{Number}$
 $T5 = [T3 \rightarrow T4]$
- (b) No MGU ($\text{Number} \neq \text{Symbol}$)
- (c) $T1 = T2$
- (d) MGU = $\{\}$ (already equal)

2. Typing Judgments

- (a) True – valid function chaining
- (b) False – mismatched argument: f expects $T2$ but gets $T1$

To construct a chain of type variables of length 5, where each variable points to the next via its content field (boxed), we create the following:

```
let tvar5 = makeTVar("TVar5"); let tvar4 = makeTVar("TVar4", makeBox(tvar5));  
let tvar3 = makeTVar("TVar3", makeBox(tvar4)); let tvar2 = makeTVar("TVar2", makeBox(tvar3));  
let tvar1 = makeTVar("TVar1", makeBox(tvar2));
```

This results in the desired chain:

$TVar1 \rightarrow TVar2 \rightarrow TVar3 \rightarrow TVar4 \rightarrow TVar5$