Question 1.1

1. MGUs

(a) T1 = [T3 -> T4]
T2 = Number
T5 = [T3 -> T4]

(b) No MGU (Number != Symbol)

(c) T1 = T2

(d) MGU = {} (already equal)

2. Typing Judgments

(a) True – valid function chaining

(b) False – False – the argument type mismatches the function's input type: f expects an argument of type T2, but x is of type T1. Therefore, unless T1 = T2, this typing judgment is invalid. Since we have no guarantee that T1 = T2, the expression is not well-typed.

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 f: () → number
Let g: (f) → f
Let h: (g) → g
Let i: (h) → h
Let j: (i) → i

This results in the desired chain:
j -> i -> h -> g -> f -> f(number)