

# Principles of Programming Languages - Homework 11

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## 1 Problem 1

(a)

$t_0 <: t_1$ : type  $t_0$  can be safely substituted by values of type  $t_1$ .

(i) True: Number can safely be substituted by values of Number.

(ii) True: Boolean can safely be substituted by values of Number.

(iii) True: Number can safely be substituted by values of Any.

(iv)

(v)

(vi) False

(vii) True: since  $\{\}$  is a subtype of Any, and  $\{\text{const f: } \{\}\}$  is a subtype of  $\{\text{const f: any, var g: bool}\}$ .

(viii)

(ix) True

(b)

(i)

(ii)

(iii)

(iv)