

## Sequences

### Solution 37

(a)

$$\langle a \rangle$$

(b)

$$1 \rightarrow a, 2 \rightarrow b, 2 \rightarrow a, 3 \rightarrow c, 3 \rightarrow b, 4 \rightarrow d$$

(c)

$$2 \rightarrow b, 3 \rightarrow c, 4 \rightarrow d$$

(d)

$$\{1, 2, 3, 4\}$$

(e)

$$\{a, b\}$$

(f)

$$\{a \mapsto 1, b \mapsto 2, c \mapsto 3, d \mapsto 4\}$$

(g)

$$\langle a, b \rangle$$

(h)

$$3 \rightarrow b$$

(i)

$\{a\}$

(j)

$c$

**Solution 38**

(a)

$$\frac{| \quad f : Place \rightarrow \mathbb{P} \ Place}{| \quad \forall p : Place \bullet f(p) = \{q : Place \mid p \mapsto q \in \text{ran } \textit{trains}\}}$$

(b)

$$\{p : Place \mid \exists_1 x : \text{dom } \textit{trains} \bullet \textit{trains}(x).2 = p\}$$

(Part c requires mu with nested quantifiers - complex)

**Solution 39**

(Solutions 39a-b require multi-word identifiers which may conflict with fuzz validation)