

問題1

(1)

$$M_1(x) \leftrightarrow M_P(x) \text{かつ} \forall t < \text{lh}(x) (t > 0 \text{かつ} M_J((x)_t) \text{なら} ((x)_t)_4 \leq \text{lh}(x)).$$

(2)

$$M_2(x, y) \leftrightarrow M_P(x) \text{かつ} y > 0 \text{かつ}$$

$$\forall t < \text{lh}(x) \left(t > 0 \text{かつ} \begin{cases} M_J((x)_t) \text{なら} ((x)_t)_2 \neq y \text{かつ} ((x)_t)_3 \neq y \\ \text{かつ} \\ M_T((x)_t) \text{なら} ((x)_t)_2 \neq y \text{かつ} ((x)_t)_3 \neq y \\ \text{かつ} \\ M_S((x)_t) \text{なら} ((x)_t)_2 \neq y \\ \text{かつ} \\ M_Z((x)_t) \text{なら} ((x)_t)_2 \neq y \end{cases} \right).$$

(3)

$$M_3(x) \leftrightarrow M_P(x) \text{かつ} \exists t < \text{lh}(x) (t > 0 \text{かつ} M_J((x)_t)).$$

(4)

$$M_4(x, y, z) \leftrightarrow M_1(x) \text{かつ} M_1(y) \text{かつ} M_P(z) \text{かつ} \forall t < \text{lh}(x) + \text{lh}(y) \div 1$$

$$\left(\begin{cases} (t > 0 \text{かつ} t < \text{lh}(x)) \text{なら} (z)_t = (x)_t \\ \text{かつ} \\ (t \geq \text{lh}(x) \text{かつ} M_J((z)_t) \text{でない}) \text{なら} (z)_t = (y)_{t - \text{lh}(x) + 1} \\ \text{かつ} \\ (t \geq \text{lh}(x) \text{かつ} M_J((z)_t)) \text{なら} (M_J((y)_{t - \text{lh}(x) + 1}) \text{かつ} ((z)_t)_4 = ((y)_{t - \text{lh}(x) + 1})_4 + \text{lh}(x) \div 1) \end{cases} \right).$$

(5)

$$M_5(x) \leftrightarrow M_P(x) \text{かつ} \exists t < \text{lh}(x) (t > 0 \text{かつ} \exists s < \text{lh}(x) (s > 0 \text{かつ} t \neq s \text{かつ} M_J((x)_t) \text{かつ} M_J((x)_s))).$$

(6)

$$M_6(x, y) \leftrightarrow M_\Delta(x) \text{かつ} (x)_3 = y.$$

(7)

$$M_7(x, y) \leftrightarrow M_\Delta(x) \text{かつ} y > 0 \text{かつ} (x)_1 = (x)_y.$$

(8)

$$M_8(x, y) \leftrightarrow M_\Delta(x) \text{かつ} M_\Delta(y) \text{かつ} \exists t < \max\{\text{lh}(x), \text{lh}(y)\} (t > 0 \text{かつ} (x)_t \neq (y)_t).$$

(9)

$$M_9(x, y, z) \leftrightarrow M_\Delta(x) \text{かつ} M_\Delta(y) \text{かつ} z > 0 \text{かつ} (y)_z = 0 \text{かつ} \forall t < \max\{\text{lh}(x), \text{lh}(y)\} (t > 0 \text{かつ} t \neq z \text{なら} (x)_t = (y)_t).$$

(10)

$$M_{10}(x, y) \leftrightarrow M_\Delta(x) \text{かつ} y > 0 \text{かつ} \forall t < \text{lh}(x) (t \geq y \text{なら} (x)_t = 0).$$

(11)

$$M_{11}(x, y) \leftrightarrow M_G(x) \text{かつ} M_G(y) \text{かつ} (x)_1 = (y)_1 \text{かつ} \forall t < \max\{\text{lh}((x)_2), \text{lh}((y)_2)\} (t > 0 \text{なら} ((x)_2)_t = ((y)_2)_t).$$