

5.2

$$0 \equiv 0 \pmod{13}$$

$$2 \equiv 2 \pmod{13}$$

$$2^2 \equiv 4 \pmod{13}$$

$$2^3 \equiv 8 \pmod{13}$$

$$2^4 \equiv 16 \equiv 3 \pmod{13}$$

$$2^5 \equiv 2^4 \cdot 2 \equiv 3 \cdot 2 \equiv 6 \pmod{13}$$

$$2^6 \equiv 2^5 \cdot 2 \equiv 6 \cdot 2 \equiv 12 \pmod{13}$$

$$2^7 \equiv 2^6 \cdot 2 \equiv 12 \cdot 2 \equiv 24 \equiv 11 \pmod{13}$$

$$2^8 \equiv 2^7 \cdot 2 \equiv 11 \cdot 2 \equiv 22 \equiv 9 \pmod{13}$$

$$2^9 \equiv 2^8 \cdot 2 \equiv 9 \cdot 2 \equiv 18 \equiv 5 \pmod{13}$$

$$2^{10} \equiv 2^9 \cdot 2 \equiv 5 \cdot 2 \equiv 10 \pmod{13}$$

$$2^{11} \equiv 2^{10} \cdot 2 \equiv 10 \cdot 2 \equiv 20 \equiv 7 \pmod{13}$$

$$2^{12} \equiv 2^{11} \cdot 2 \equiv 7 \cdot 2 \equiv 14 \equiv 1 \pmod{13}$$

$$\text{Ainsi } \{\overline{0}; \overline{2}; \overline{2^2}; \overline{2^3}; \overline{2^4}; \overline{2^5}; \overline{2^6}; \overline{2^7}; \overline{2^8}; \overline{2^9}; \overline{2^{10}}; \overline{2^{11}}; \overline{2^{12}}\} = \\ \{\overline{0}; \overline{1}; \overline{2}; \overline{3}; \overline{4}; \overline{5}; \overline{6}; \overline{7}; \overline{8}; \overline{9}; \overline{10}; \overline{11}; \overline{12}\} = \mathbb{Z}/13\mathbb{Z}$$