

Problem

Let $J5 = \{0, 1, 2, 3, 4\}$, and define a function $F: J5 \rightarrow J5$ as follows: For each $x \in J5$, $F(x) = (x^3 + 2x + 4) \bmod 5$. Find the following:

a. $F(0)$

b. $F(1)$

c. $F(2)$

d. $F(3)$

e. $F(4)$

Step-by-step solution

Step 1 of 5

(a) To find $F(0)$

Put $x = 0$ in $F(x) = (x^3 + 2x + 4) \bmod 5$

$$\begin{aligned} F(0) &= (0 + 2 \cdot 0 + 4) \bmod 5 \\ &= 4 \end{aligned}$$

Step 2 of 5

(b) To find $F(1)$ put $x = 0$ in $F(x) = (x^3 + 2x + 4) \bmod 5$

$$\begin{aligned} F(1) &= (1 + 2 + 4) \bmod 5 \\ &= 2 \end{aligned}$$

Step 3 of 5

(c) $F(2) = (2^3 + 2 \cdot 2 + 4) \bmod 5$

$$\begin{aligned} &= (8 + 4 + 4) \bmod 5 \\ &= 16 \bmod 5 \\ &= 1 \end{aligned}$$

Step 4 of 5

(d) $F(3) = (3^3 + 2 \cdot 3 + 4) \bmod 5$

$$\begin{aligned} &= (27 + 6 + 4) \bmod 5 \\ &= 37 \bmod 5 \\ &= 2 \end{aligned}$$

Step 5 of 5

$$(e) \ F(4) = (4^3 + 2 \cdot 4 + 4) \bmod 5$$

$$= (64 + 8 + 4) \bmod 5$$

$$= 76 \bmod 5$$

$$= 1$$