

$$2 \quad \frac{(-1)^{3n}}{2^{2n}} - \frac{(-1)^{3 \cdot 4}}{2^{2 \cdot 4}} - \frac{(-1)^{12}}{2^8} - \boxed{\frac{1}{256}}$$

$$3 \quad a_2 = (2^2 + 1)1 = 5$$

$$a_3 = (3^2 + 1)5 = 50$$

$$10 \quad f(x) = x^3 - 1 \quad g(x) = x + 3$$

$$f \circ g = f(g(x)) = f(x+3) = \boxed{A^3 - 1}$$

$x+3 = A$

$$g \circ f = g(f(x)) = g(x^3 - 1) = \boxed{B + 3}$$

$x^3 - 1 = B$

$$11 \quad f(x) = f(y) \quad f(n) = -x + 23$$

$$\Rightarrow -x + 23 = -y + 23 \Rightarrow -x = -y \Rightarrow x = y$$

so it is one to one

$$f(x) = -x + 23$$

$$y = f(x)$$

$$y = -x + 23$$

$$y - 23 = -x$$

$$23 - y = x$$

$$f(x) = -x + 23$$

$$f(23 - y) = 2(23 - y) + 23 = f(23 - y) = 46 - 2y + 23$$

$$= 69 - 2y \quad \text{so onto}$$

+ Bijective

$$\boxed{y = 23 - x \text{ is the inverse}}$$

$$12 \quad 3 \nmid a^2$$

$$a = 3x$$

$$(3x)^2 - 1 = 9(x^2 - 1)$$

this will not be divisible by 3

$$20 \quad f(29) = 7(29) + 3 \pmod{30}$$

$$= 206 \pmod{30}$$

$$= 26$$