

DISCRETE MATHEMATICS PROBLEMS

Lesson 2.3

1. Consider $f : \mathbb{Z}_7 \rightarrow \mathbb{Z}_7$ and $g : \mathbb{Z}_7 \rightarrow \mathbb{Z}_7$ defined as $f(x) = 2x + 3$ and $g(x) = 4x + 2$. Classify f and g . Obtain $(g \circ f)^{3420}$ and $(f \circ g)^{264}$.
2. Let $f : \mathbb{Z}_6 \rightarrow \mathbb{Z}_6$ and $g : \mathbb{Z}_6 \rightarrow \mathbb{Z}_6$ be defined as $f(x) = x + 4$ and $g(x) = 3x$. Classify g and $g \circ f$. Obtain $(g \circ f)^{250}$ y $(g \circ f)^{121}$.
3. Compute the g.c.d. and the m.c.m of the numbers a and b when:
 - a) $a = 689, b = 234$
 - b) $a = 54321, b = 50$
 - c) $a = 29341, b = 1739$
 - d) $a = 10285, b = 9009$
 - e) $a = 7300, b = 1316$
4. Solve in \mathbb{Z}_6 the following equations:
 - a) $3x + 3 = 0$
 - b) $4x + 2 = 4$
 - c) $2x + 5 = 0$
5. Solve the following equations in \mathbb{Z}_4 :
 - a) $3x + 2 = 1$
 - b) $2x + 1 = 2$
 - c) $2x + 2 = 2$
6. Solve the following equations with congruences:
 - a) $34x \equiv 51 \pmod{85}$
 - b) $100x \equiv 74 \pmod{127}$
 - c) $472x \equiv 32 \pmod{92}$
 - d) $4x \equiv 8 \pmod{12}$
 - e) $27x \equiv 4 \pmod{58}$
 - f) $34x \equiv 12 \pmod{23}$