

Problem 1. Draw a picture of congruence modulo 4 as a relation on the integers.

Problem 2. Every relation on the empty set is an equivalence relation.

- A) True B) False

Problem 3. Suppose that Q and R are equivalence relations on a set S . Is $Q \cup R$ an equivalence relation?

- A) Yes B) No C) Sometimes D) I don't know

Problem 4. Let Q and R be two equivalence relations on a set S . Is $Q \cap R$ an equivalence relation on S ?

- A) Yes B) No C) Sometimes D) I don't know

Problem 5. Suppose that Q is congruence modulo 2 and R is congruence modulo 3. Find a familiar name for the relation $Q \cap R$.

Problem 6. Let n be an integer. Suppose that $a \equiv a' \pmod{n}$ and $b \equiv b' \pmod{n}$. Prove that $a + b \equiv a' + b' \pmod{n}$.

Problem 7. Suppose that R is a relation on a set S . Let $Q = S \times S - R$. Prove that R is reflexive if and only if Q is irreflexive.

Problem 8. Let X be a set. Show the only relation on X that is both symmetric and antisymmetric is equality.