1. Decide which of the four properties (reflexive, symmetric, transitive, antisymmetric) are true for the following relations.

(i) the usual $\leq$ among the real numbers;

(ii) the usual $<$ among the real numbers;

(iii) the usual $=$ among the real numbers;

(iv) aRb if a and b have the same residue modulo 3 among the integers;

(v) aRb if the reduced quotient $\frac{a}{b}$ has odd denominator among the integers;

(vi) the usual $|$ (divisible) among the integers;

(vii) aRb if a is the son of b among people;

(viii) aRb if a and b have a border crossing among countries;

(ix) aRb if we can travel from a to b on dry land among cities;

(x) (in the last three the set is of all circles on the plane) $c_1 R c_2$ if c_1 and c_2 meet;

(xi) $c_1 R c_2$ if c_1 contains the centre of c_2;

(xii) $c_1 R c_2$ if c_1 contains c_2 or c_2 contains c_1.

2. Compute the following divisions with remainder:

(i) $5 : 1$

(ii) $1 : 5$

(iii) $-333 : 5$

(iv) $36357478585 : 10$

(v) $2^{12} + 1 \ : 2$

(vi) $3^{12} - 1 \ : 3$

(vii) $10^{12} : 9$

3.

(i) Convert 26 to base 16, 8, 4, 2, 5 and 26!

(ii) Convert 2025 to base 2, 8 and 16!

(iii) What is the decimal (base 10) representation of the number 120201_3?