- 1. For how many elements $n \in \{23, 24, ..., 58\}$ is the following statement true: 'if n is divisible by 5 or by 7 then n is greater than 43'?
- 2. Find the union $\bigcup_{t \in \mathbb{N} \setminus \{0\}} A_t$ and intersection $\bigcap_{t \in \mathbb{N} \setminus \{0\}} A_t$ of the sets

$$A_t = \left\langle 2 + \frac{3}{t}; 7 + \frac{1}{t^2} \right\rangle.$$

- Prove that the relation R defined on the set X = Z by mRn ≡ m² + 7n² is divisible by 4 is an equivalence relation. Determine and describe its equivalence classes.
- 4. Determine for what values of the parameter $a \in \mathbb{R}$ the operation $x \ddagger y = xy + 3x + 3y + a$ defined for $x, y \in \mathbb{R}$ is commutative and associative.
- 5. Let X be the set of all different nine-letter words that can be obtained by permuting the letters of the word BOOMERAMG (the misspelling is deliberate). How many elements does X contain? In how many of them there are no neighbouring identical letters?
- 6. How many solutions of the equation a + b + c + d = 60 in positive integers satisfy simultaneously all the following conditions: $a \leq 30, 10 \leq c \leq 40$ and a, b, c, d are all odd?