1. Depicted is a graph, whose vertices are represented by circles and edges by arrows. The edges are oriented and may be traversed only in the direction marked by the arrow.
   a) Find the number of paths by which one can reach the vertex K from the vertex A.
   b) For each vertex determine the number of different paths by which one can reach it from the vertex A.

2. Transform the following logical formula into disjunctive normal form:
   \((x \lor y) \land (\neg x \lor \neg z) \land (y \lor \neg z)\)
   The symbols \(x, y, z\) denote logical variables, the symbol \& stands for conjunction, \(\lor\) denotes disjunction, and \(\neg\) denotes negation of the variable \(x\).
   a) Find any solution.
   b) Find a solution in the form of a disjunction with at most two clauses.

3. Design a deterministic finite automaton over the alphabet \(\{0, 1\}\) that accepts exactly words of length at least 3 and with the first and third letter equal. For example, it accepts the words 101, 1110, 0000, but it rejects the words 1001, 100, 11. Write the transition function of the automaton as a table and draw the automaton in the form of a transition diagram. Try to design the simplest possible automaton, that is, one with the smallest number of states.

4. The following program is given (the Pascal form and the C form are equivalent):

```pascal
program A;
var N, X: integer;
begin
read(N);
X := 0;
while N > 0 do
begin
  X := X*10 + 9 - N mod 10;
  N := N div 10;
end;
write(X);
end.
```

```c
main() /* A */
int n, x;
scanf( "%d", &n); x = 0;
while (n > 0)
{
  x = x*10 + 9 - n%10;
  n /= 10;
}
printf( "%d", x);
```

a) What result do we get after computation with the input value \(N = 9501\)?
b) Determine for which input values \(N\) the result is the number \(X = 25\). Find the three smallest such \(N\) (if they exist).
c) Determine the smallest positive input value \(N\) for which the result of the computation equals to the input value, that is, \(X = N\).