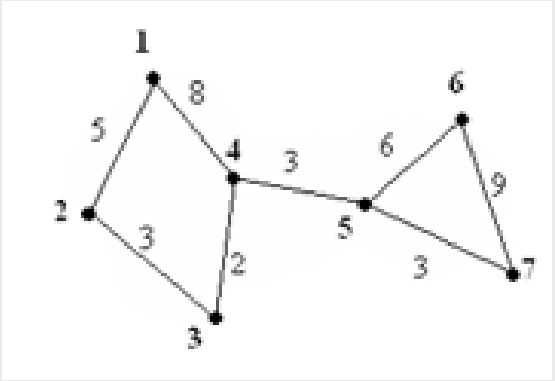
# Problem 1
## String difference

- We are given two strings, $A$ and $B$, composed of lowercase letters of the English alphabet, s.t. $|A| > |B|$. Some characters in $B$ are unknown.
- We define the *total difference* between the strings by adding up Hamming distances between $B$ and every substring of $A$ that has length $|B|$.
- Choose the unknown characters in $B$ such that the total difference is minimal.
- Example: $A =$ `abbcd`, $B =$ `b?d` $\longrightarrow$ `bbd`
- Constraints: $1 \leq |B| < |A| \leq 10^6$.

# Problem 2
## Power grid

- You are given a power grid with $N$ nodes, and each link has a teardown time $w_{ij}$, specifying the number of hours it needs to be neglected in order to stop being operational.
- You also have a list of pairs of nodes that **should not** be connected (either directly, or via several links) in order for the network to operate safely.
- Determine the minimal amount of hours you need to wait before the grid can be safely start transporting electricity.
- Example: 

, forbidden: $2 \to 5$, $1 \to 3$, $5 \to 7 \longrightarrow 6$ hours.

# Problem 3
## Finding lines

$\sim$ There are $n$ distinct points on a 2D plane (given as $(x, y)$ coordinate pairs). Determine whether or not there is a line that passes through more than $p\%$ of them.

$\sim$ Constraints: $1 \leq n \leq 10^5$, $20 \leq p \leq 100$, $0 \leq x, y \leq 10^9$.

# Problem 4
## Dinosaur Menace

- After a failed DNA experiment, $N$ dinosaurs are sleeping in a rectangular laboratory of size $W \times H$—for each dinosaur, an $(x, y)$ coordinate is known.
- A scientist starts at $(0, 0)$ and wants to get to $(W, H)$. He does not want to awake the dinosaurs, so he wants to be as far away from every one of them as possible on his path.
- What is the shortest distance from a dinosaur he will have if he takes the optimal path?
- Example: $N = 1$, $W = H = 2$, $(x, y) = (1, 1) \longrightarrow 1$.
- Constraints: $1 \leq N \leq 300$, $2 \leq W, H \leq 10^6$.

# Problem 5
## Islands

- A captain is exploring an archipelago of $n$ islands. He does this by going from island $i$ to island $j$ for all possible ordered pairs $(i, j)$, and recording how many islands, $isl_{ij}$, were on his RHS ($isl_{ii} = 0$ by definition).
- After doing this task, he wants to know, for every ordered tuple $(A, B, C)$, *was island $C$ on his RHS when he went from $A$ to $B$?*
- Example: $N = 3$, $isl = \begin{pmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ 1 & 0 & 0 \end{pmatrix}$
  $\longrightarrow$ the 'YES' tuples are $(1, 2, 3)$, $(2, 3, 1)$ and $(3, 1, 2)$.
- Constraints: $3 \leq n \leq 200$.