

J: Jail or Joyride

Problem Author: Reinier Schmiermann



- **Problem:** find the least distance that a police car needs to travel to catch a group of teenagers on a graph, given that the teenagers flee as far away as possible on every approach.

Statistics: 5 submissions, 0 accepted, 2 unknown

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- **Problem:** find the least distance that a police car needs to travel to catch a group of teenagers on a graph, given that the teenagers flee as far away as possible on every approach.
- **Observation 1:** If the police can approach the teenagers via multiple edges, then the teenagers can always reach every vertex in the graph.
 - In particular: the approach direction of the police does not matter.
 - The police should always take the shortest path.

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- Observation 1: If the police can approach the teenagers via multiple edges, then the teenagers can always reach every vertex in the graph.
 - In particular: the approach direction of the police does not matter.
 - The police should always take the shortest path.
- Observation 2: If the police can approach the teenagers via only one edge, then either the teenagers are in a leaf, or they are not as far away as possible from the police.
 - Second case only happens at the start.
 - After this, the teenagers can always either reach the whole graph, or nothing at all.

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- The police always takes the shortest path to the teenagers.
- After the first approach of the police, the teenagers can always either reach the whole graph, or nothing.

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- Simulate the first approach of the police separately.

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- After the first approach of the police, the teenagers can always either reach the whole graph, or nothing.
- Simulate the first approach of the police separately.
- For every vertex which is not a leaf: find all vertices which are as far away as possible (use APSP).
- Use DFS on this new directed graph to compute for every vertex v the maximal distance the police needs to travel after approaching the teenagers in v .
 - If there is a reachable cycle in this new graph, the police cannot catch the teenagers.