Floyd-Warshall Algorithm

Floyd-Warshall’s Algorithm is an alternative to Dijkstra in the presence of negative-weight edges (but not negative weight cycles).

Algorithm Design:
- **Goal:** Find the shortest path from vertex $u$ to $v$.
- **Setup:** Create an $n \times n$ matrix that maintains the best known path between every pair of vertices:
  - Initialize $(u, u)$ to 0.
  - Initialize all edges present on the graph to their edge weight.
  - Initialize all other edges to $+\infty$.

For every vertex $k$, consider which of the following are shorter:
- $\text{path}(u, v)$ - or -
- $\text{path}(u, k) + \text{path}(k, v)$

**Big Idea:**
- Store intermediate results to improve build towards an optimal solution.
- Example application of memoization.

Running Time:

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...and this is just the beginning. The journey continues to CS 374!

CS 225 – Things To Be Doing:
1. MP7 due tonight (April 30); standard grace period applies.
2. Final Exam starts Thursday, May 3