Exercise 12.15. It's-a me, Mario! This problem is inspired by Super Mario World, where Mario must make it from some starting point to the flag in front of a castle, collecting as many coins as possible along the way.

Let $G = (V, E)$ be a directed graph where each vertex $v \in V$ has $C_v \geq 0$ coins. For a walk in G, we say that the *number of coins collected by the walk* is the total sum of C_v over all *distinct* vertices v in the walk. (If we visit a vertex v more than once, we still only get C_v coins total.) Given $s, t \in V$, the goal is to compute the maximum number of coins collected by any (s, t)-walk.

Exercise 12.15.1. Let G be a DAG. For this problem, either (a) design and analyze a polynomial time algorithm (the faster the better), or (b) prove that a polynomial time algorithm would imply a polynomial time algorithm for SAT.

Solution. □

Exercise 12.15.2. Let G be a general directed graph. For this problem, either (a) design and analyze a polynomial time algorithm (the faster the better), or (b) prove that a polynomial time algorithm would imply a polynomial time algorithm for SAT.

Solution. □