CS 146: Data Structures and Algorithms (Taylor) **January 7, 2024**

You have survived the zombie apocalypse from a week or so ago, but society has been destroyed. It is rebuilding, but with no money, it now has a strictly produce (fruit/vegetable/fungi) based economy. For each person, they have trades that they are willing to make, such as "If you give me 1 banana, I will give you .72 apples, or .26 grapefruits. Or, if you give me 1 apple, I will give you .5 peaches." Even though society has been destroyed, by scavenging scales and razors from the science department, any deal can be scaled down arbitrarily: if you give them .1 bananas, they can give you .072 apples. Also, for the produce each person has available, they can scale it arbitrarily large, so if you give that same person 1000000 bananas, they can give you 720000 apples. (It takes some effort to grow and harvest food, but it all grows very well, due to the massive amounts of fertilizer (RIP) left from the apocalypse.) Everybody will also stick around to do the same deal later. Another nice side-effect of the zombie battles: produce is now "undead", and will never rot.

You have collected the trade rates for all of the other n survivors of the apocalypse. Starting with nothing but an apple in your pocket, you want to figure out if there is a way that you can freeload off of the new society: set up a sequence of trades, starting with your single apple, such that you can generate enough food to eat, merely by trading, while never doing any growing or harvesting yourself. Give an algorithm to determine if you can freeload.