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- a) If I am given N junctions, with one being a starting point, and another being an end point, then the largest number of possible paths, in the case where every junction is connected to every other junction, would be at least $(N-2)!$. $N-2$ factorial because it is the number of permutations of the junctions which are not starting or end points. Another way to think about it is like an expanding tree of paths, if every junction produces k novel paths on average, then the number of paths will be k^N .
- b) Yes, this is an inherently hard problem. Firstly because it is literally a hard computational problem, its complexity is worse than polynomial. Secondly because we have no knowledge before the search to whittle down the possibilities, so it is essentially a brute force search.