Combo class Problems

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Ladies and Gentlemen –start your engines!

1.1: N-towns Theorem. *Consider a network of $N \geqslant 1$ towns, each connected to every other town by a one-way*[♡1] *road. Then . . .*

A: *There exists at-least-one universal town. Town α is **universal** if for each other town, β, you can legally bicycle from α to β (possibly passing through intermediate towns).*

Solved by: *John P., 2011t. Zach N., 2012t. Michael E., 2013t. Lizzie [Donna] N-C., 2017g.*

B: *There exists a **2-universal** town; it can access each town using at most two roads [i.e, at most one intermediate town].*

Solved by: *Michael V., Terry T., Alex H., Stephen H., 2011t. Ken D., 2017g.*

C: *In a network of $N \geqslant 3$ towns, it is always possible to reverse at most one road so that, now, every town is universal.*

Solved by: *Ken D., 2017g.* ♢

[♡1] We have a ***directed graph***; a "***digraph***". This one is a "***complete digraph*** on N vertices"; it has $\binom{N}{2}$ directed-edges, that is, $\frac{1}{2}N[N-1]$ many ***oriented edges***.