An Algorithm for Creating Puzzles

By Alaric Stephen

oddsandevenings.com

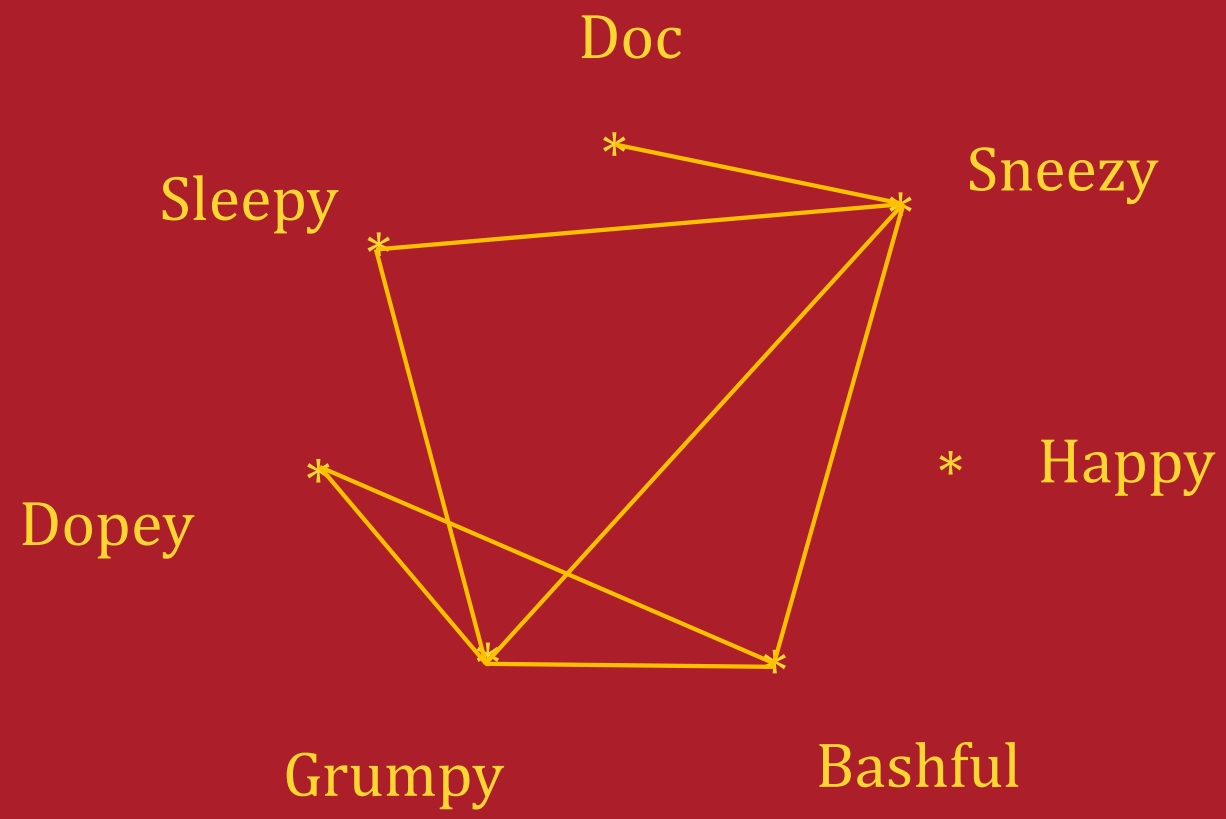
Snow White is trying to get the seven dwarfs to sit down around their circular table, but it turns out they are a fussy lot and some of them are point blank refusing to sit next to others.

Doc is worried he may get an infection from Sneezy, while Dopey, Sneezy and Bashful are all a bit frightened of Grumpy while he's in one of his tempers. Bashful had an awful falling out in the mine with Dopey and Sneezy and finally Sleepy doesn't want to be woken up by the loud noises from Sneezy or Grumpy.

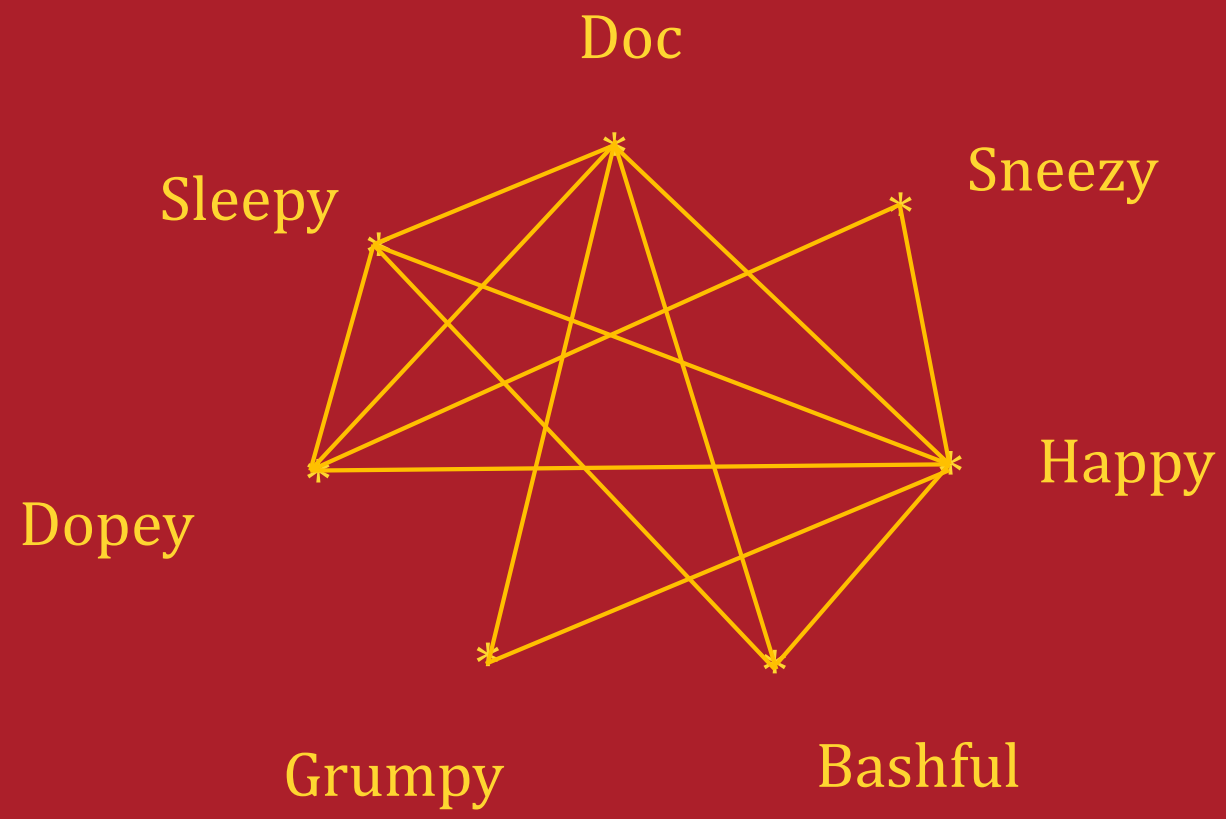
Who's sat next to Happy?

Making it easier

Making it easier

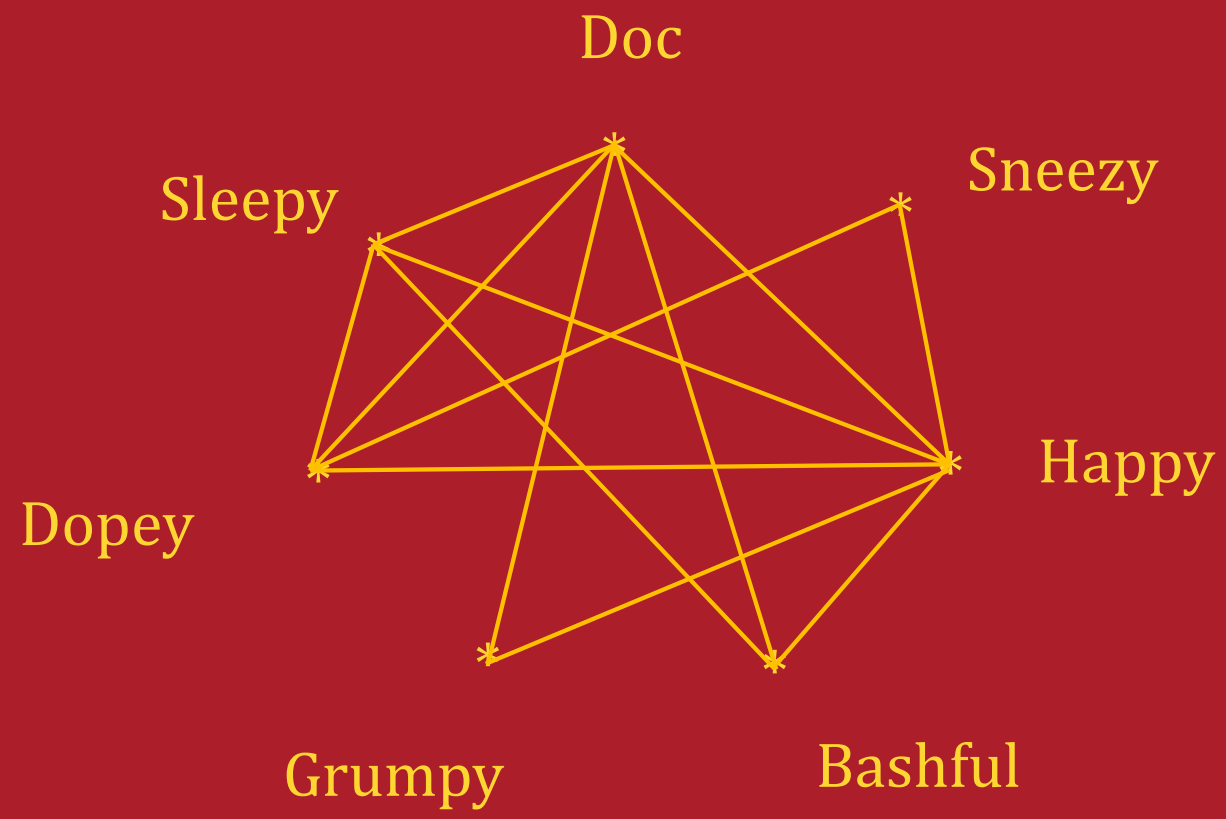


Making it easier



Making it easier

Find a Hamiltonian Cycle



Making it easier

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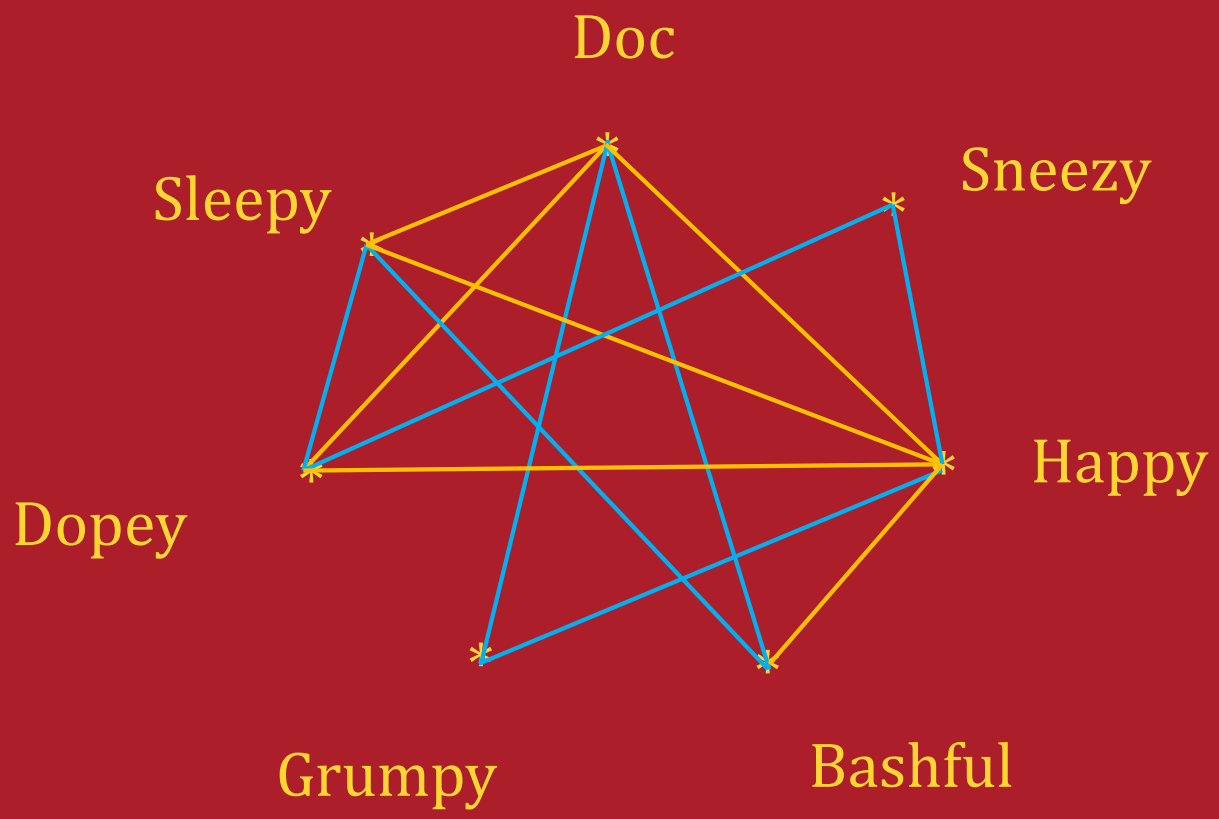

What do we want from the algorithm?

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1. Unique Hamiltonian Cycle

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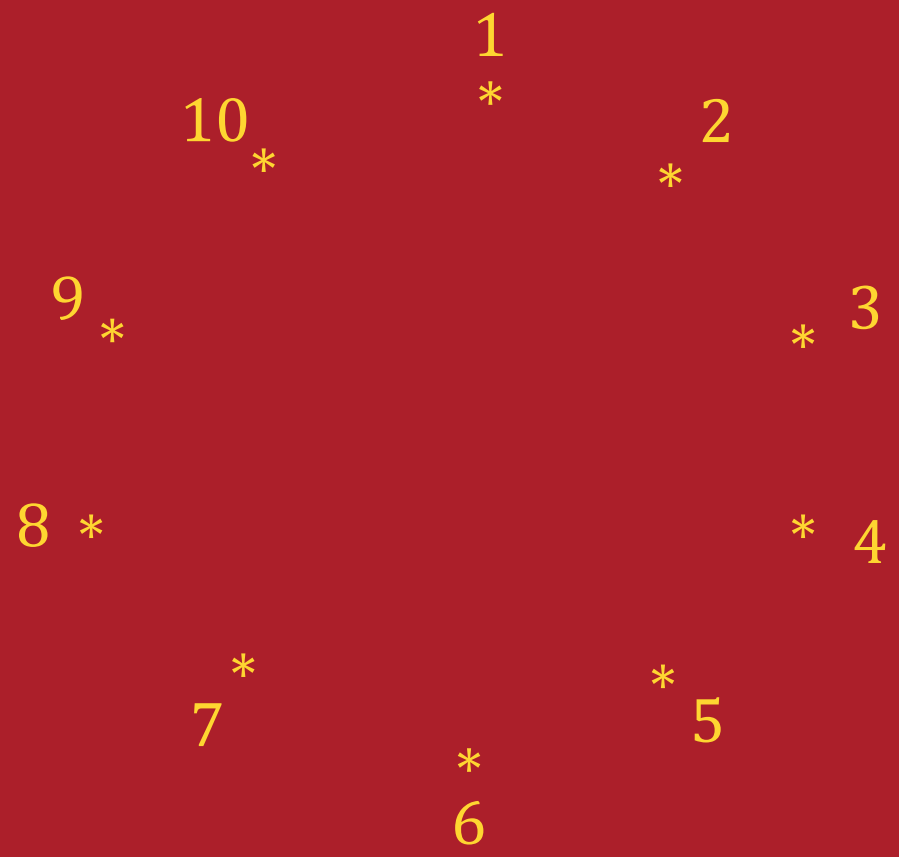
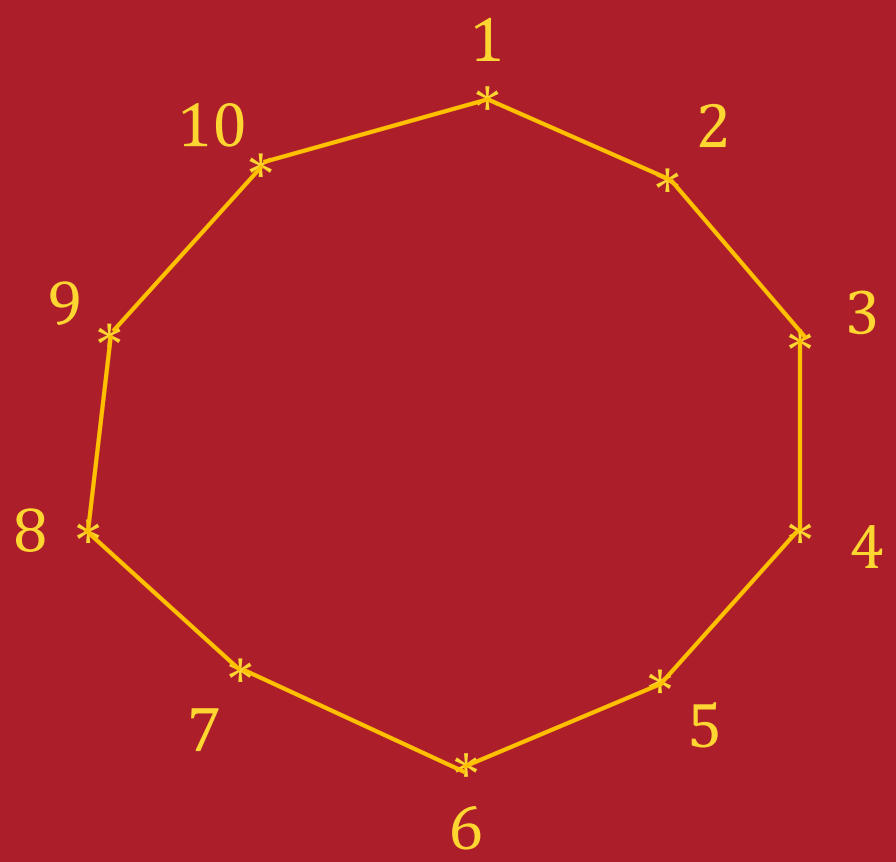
2. A Relatively Dense Graph

The Algorithm



Draw and label n points

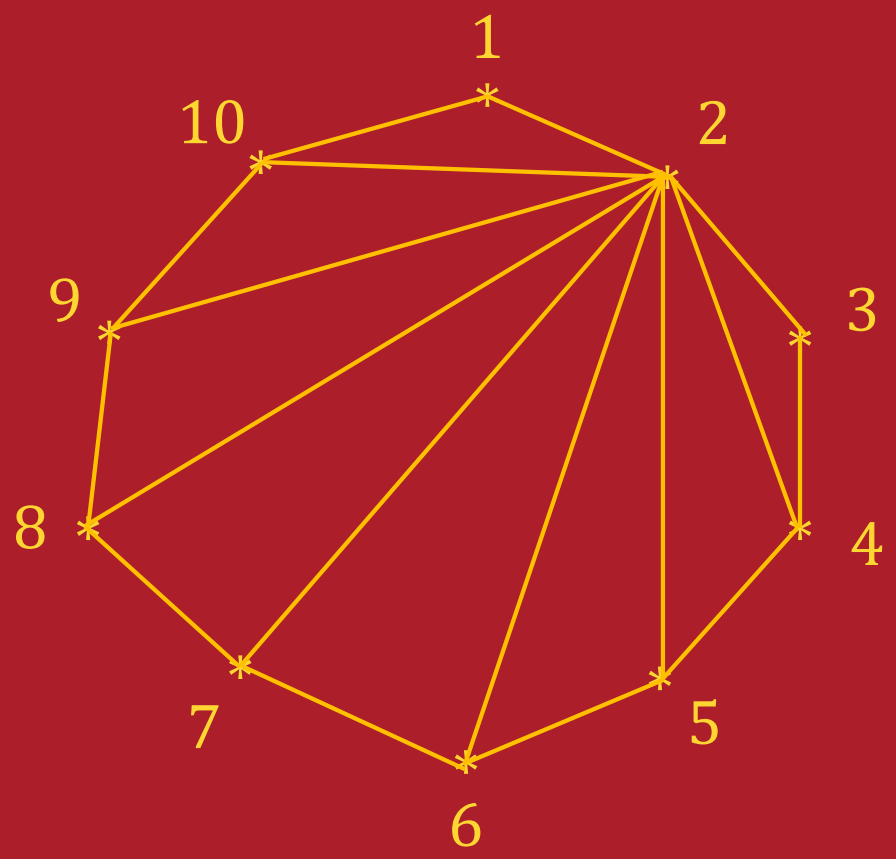
The Algorithm



Connect the nodes around the edge

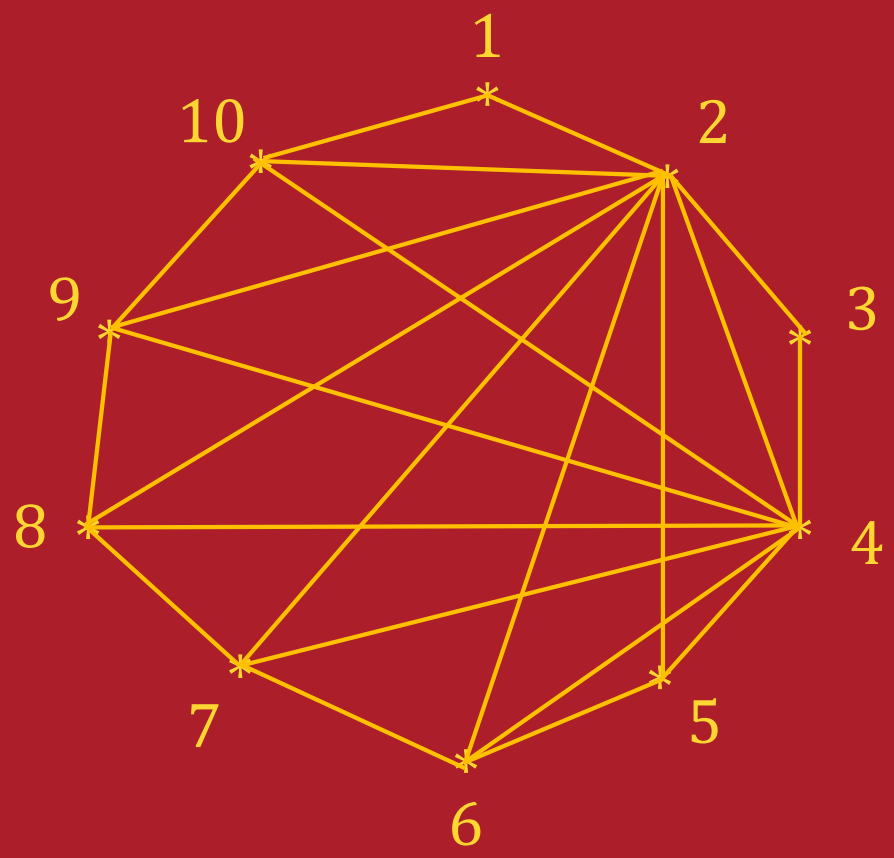
This will be our solution

The Algorithm



Connect every even node to every node above it

The Algorithm



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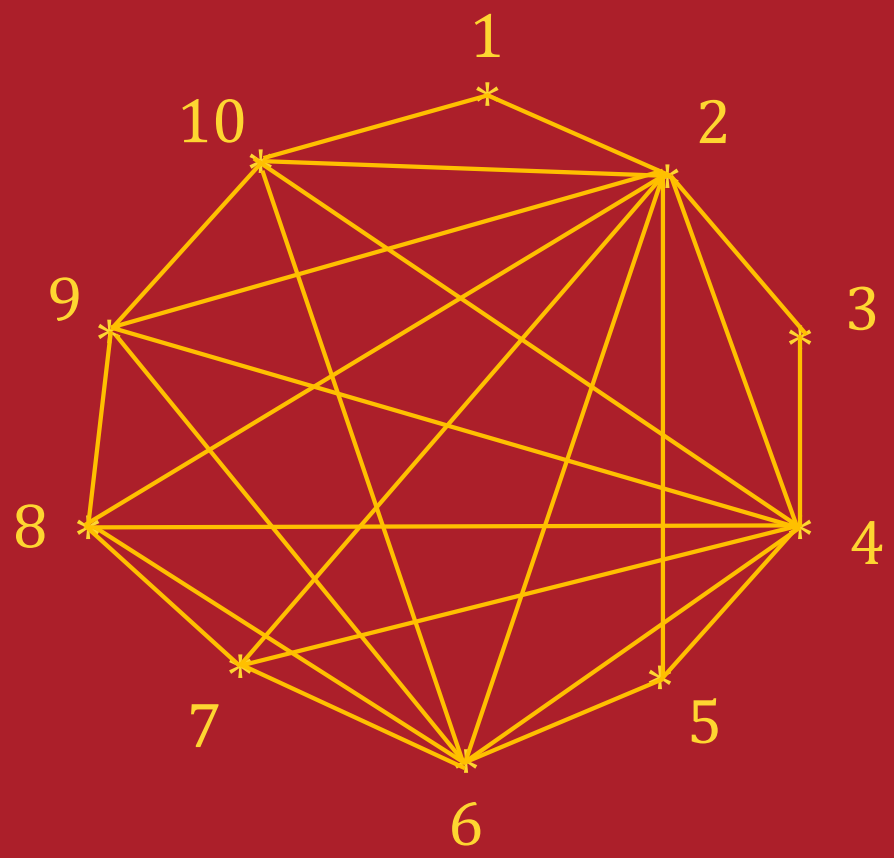

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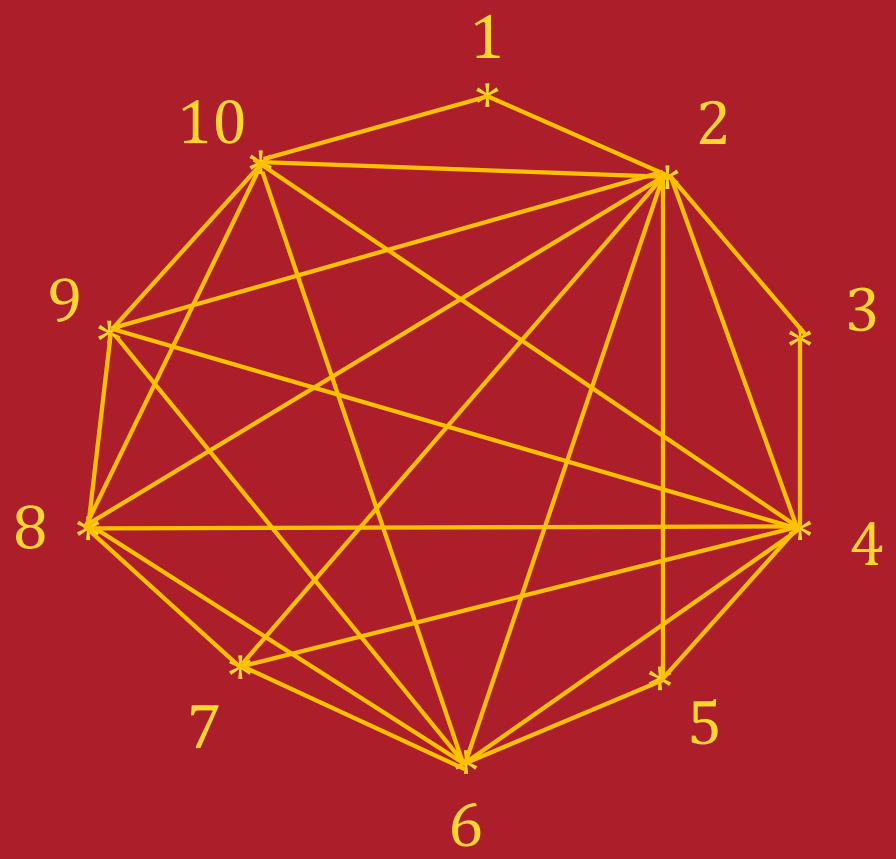

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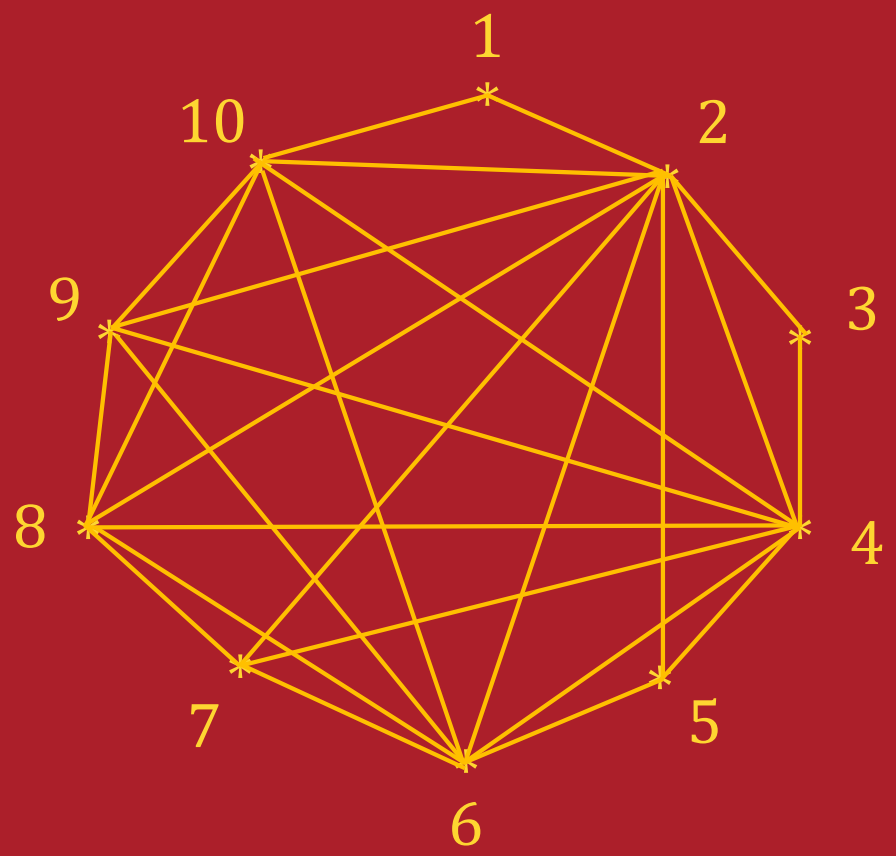
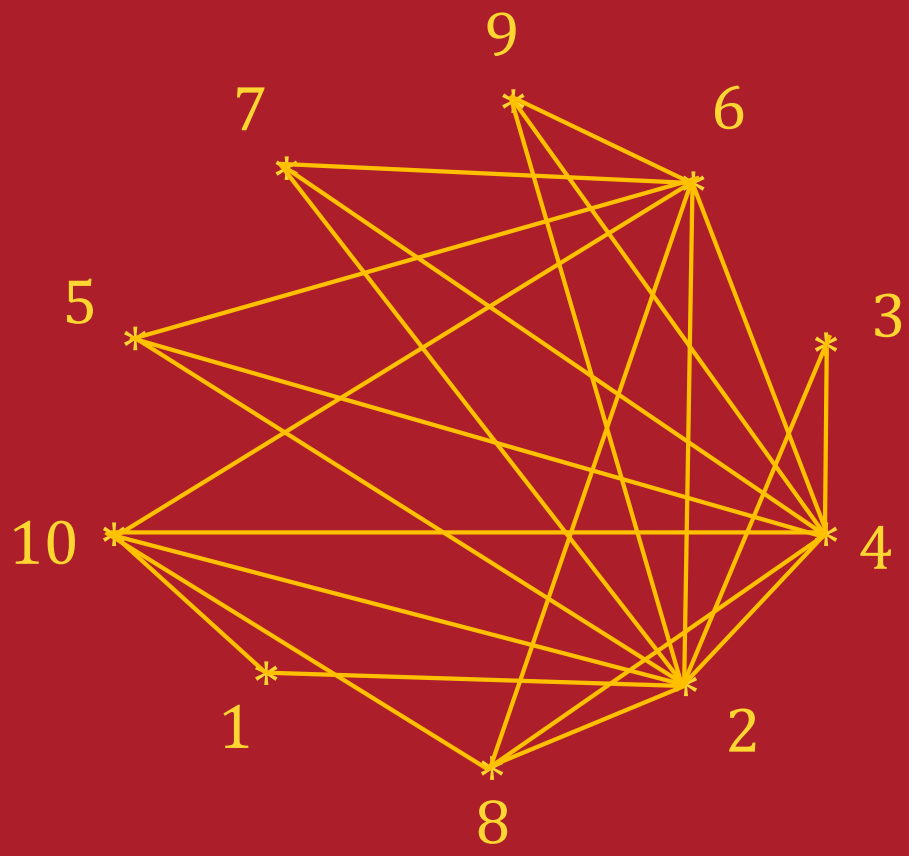


This has a unique Hamiltonian Cycle (around the edge)

We can hide it by moving the points around and relabeling



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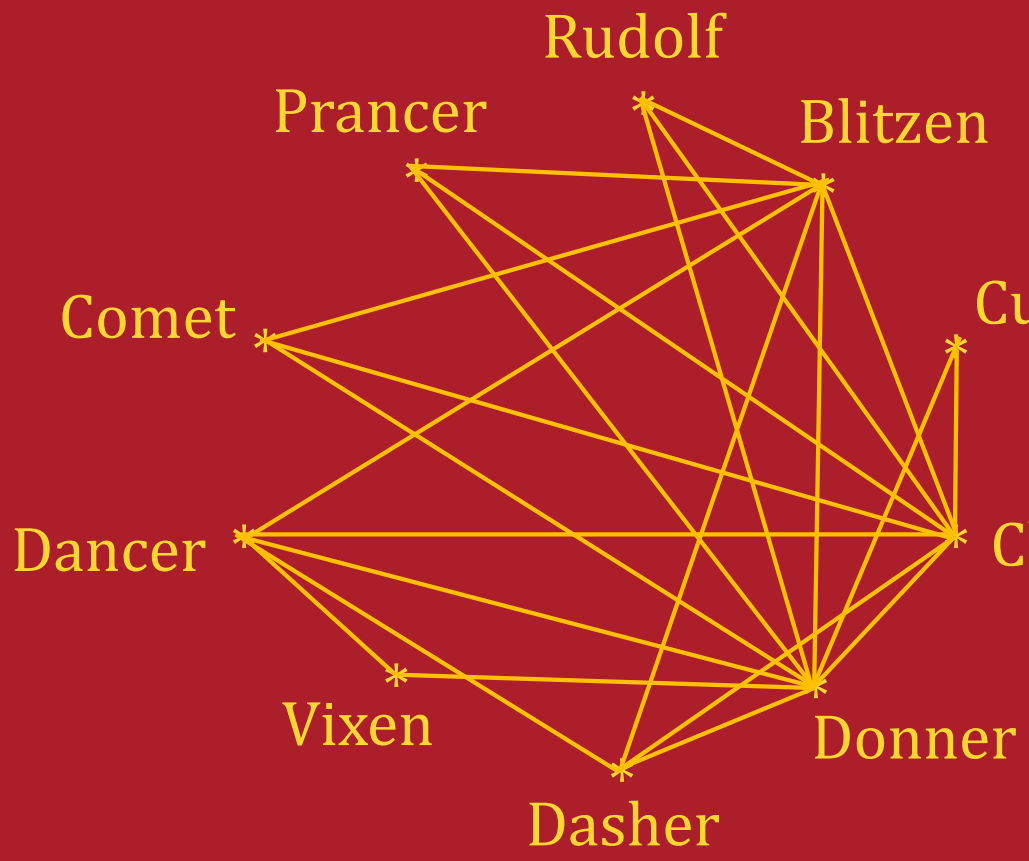

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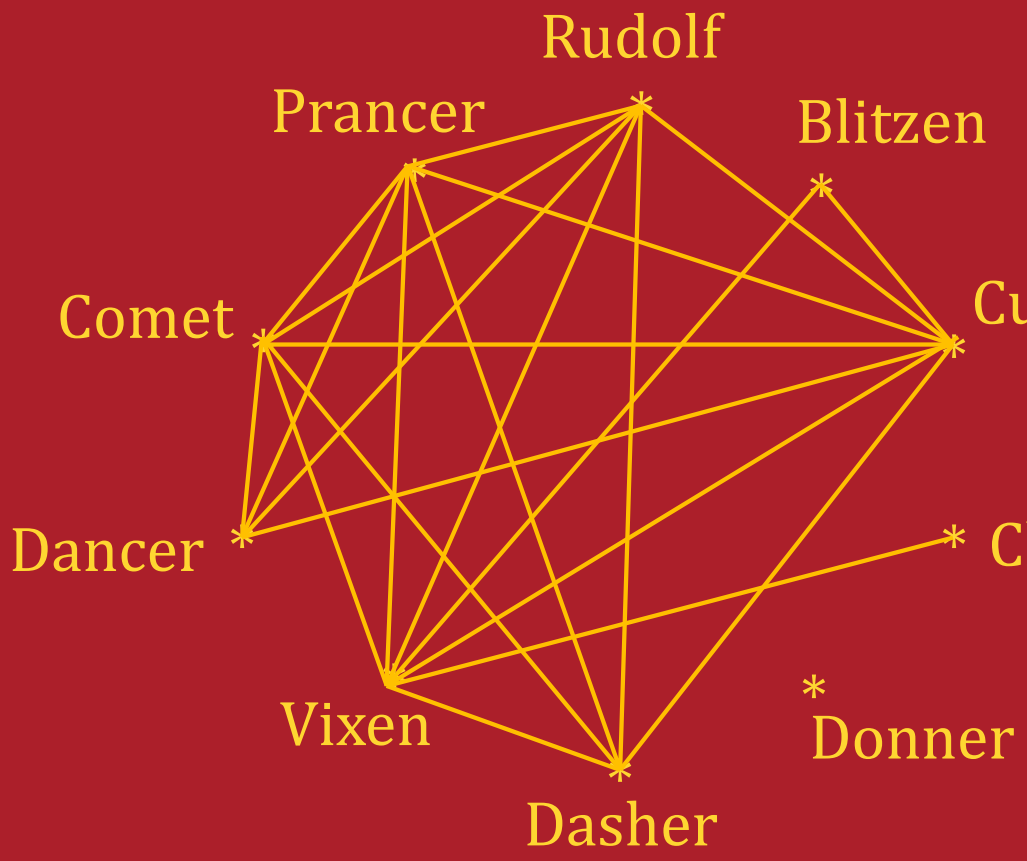
Optional (to make a word puzzle)



We can use the Compliment Graph

This process can make puzzles to an arbitrary level of difficulty

I cohost a Maths and Puzzles podcast:

www.oddsandevenings.com

(or wherever you normally get your podcasts)