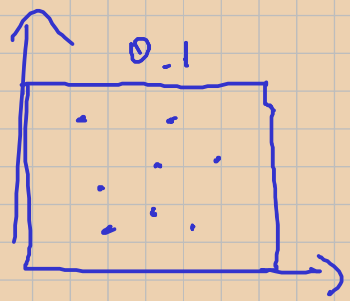
Using a "topology" approach, like the Molloy-Reed condition is basically the same thing as to use a "percolation" approach.

Things are too complicated in real world networks to use topology. It's more usable to use a percolation approach.

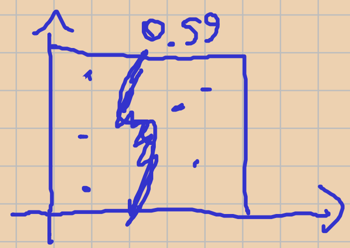
$\boxed{\text{If } \quad p < p_c}$

percolation threshold



There's no connected component that allows us to go from A to B

$\boxed{\text{If } \quad p = p_c}$



There's at least one connected component that allows us to go from A to B

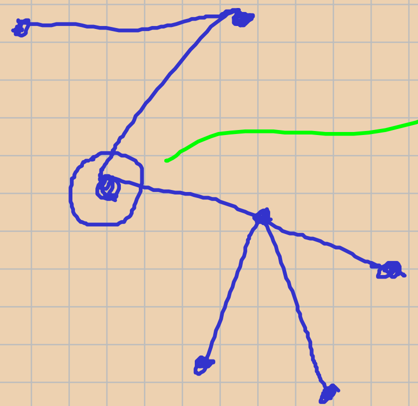
$\boxed{\text{If } \quad p > p_c}$

If we increase p even further, all connected components allow us to go from A to B

In the paper from NSW (2001), it's shown that the average size of the clusters:

$\langle s \rangle \propto$ some metrics dependant on the particular graph.

Let's talk about resilience:



if I destroy this node, a part of the network is isolated

What about random attacks? I can make a simulation where every node has a probability to "shutting down" p, and see how the network behave.
This is the same concept of percolation!

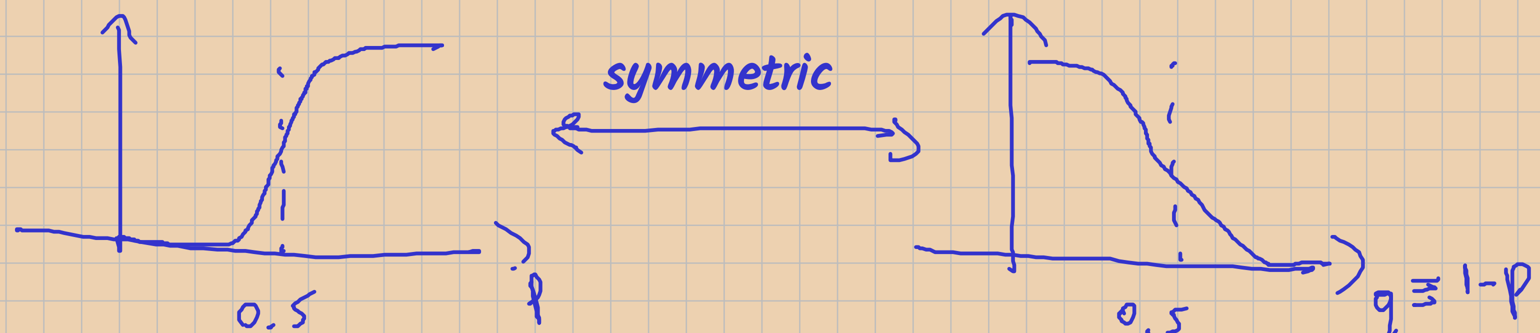
The percolation threshold to still have single connected component is:

$$\boxed{p_c = \frac{\langle k^2 \rangle - 2\langle k \rangle}{\langle k^2 \rangle - \langle k \rangle}}$$

For a Barabasi-Albert network (degree distribution is a powerlow with alpha=3), we can work out the formula above to have $p_c \approx 1$ because $\langle k^2 \rangle$ diverges

This is good! It means that a B-A type network is basically impossible to break with random attacks!

While looking at resilience, we need to look at the percolation "in the reversed way"



this is the percolation threshold to reach if we want at least a connection from a to b

this is the percolation threshold we need to reach to deoccupy, so we won't have a connection from a to b.

If you want to attack a network, it's best to do a TARGETED ATTACK, it's better to attack nodes with higher degree or betweenness

In principle, attacking based on betweenness works better, but degree is easier to compute

As we saw before, for gamma=3 in a scale-free network we always have a giant component. This result is based on topology (molloy and reed condition)

If we use an approach based on percolation... The probability is the probability of removal, of being empty