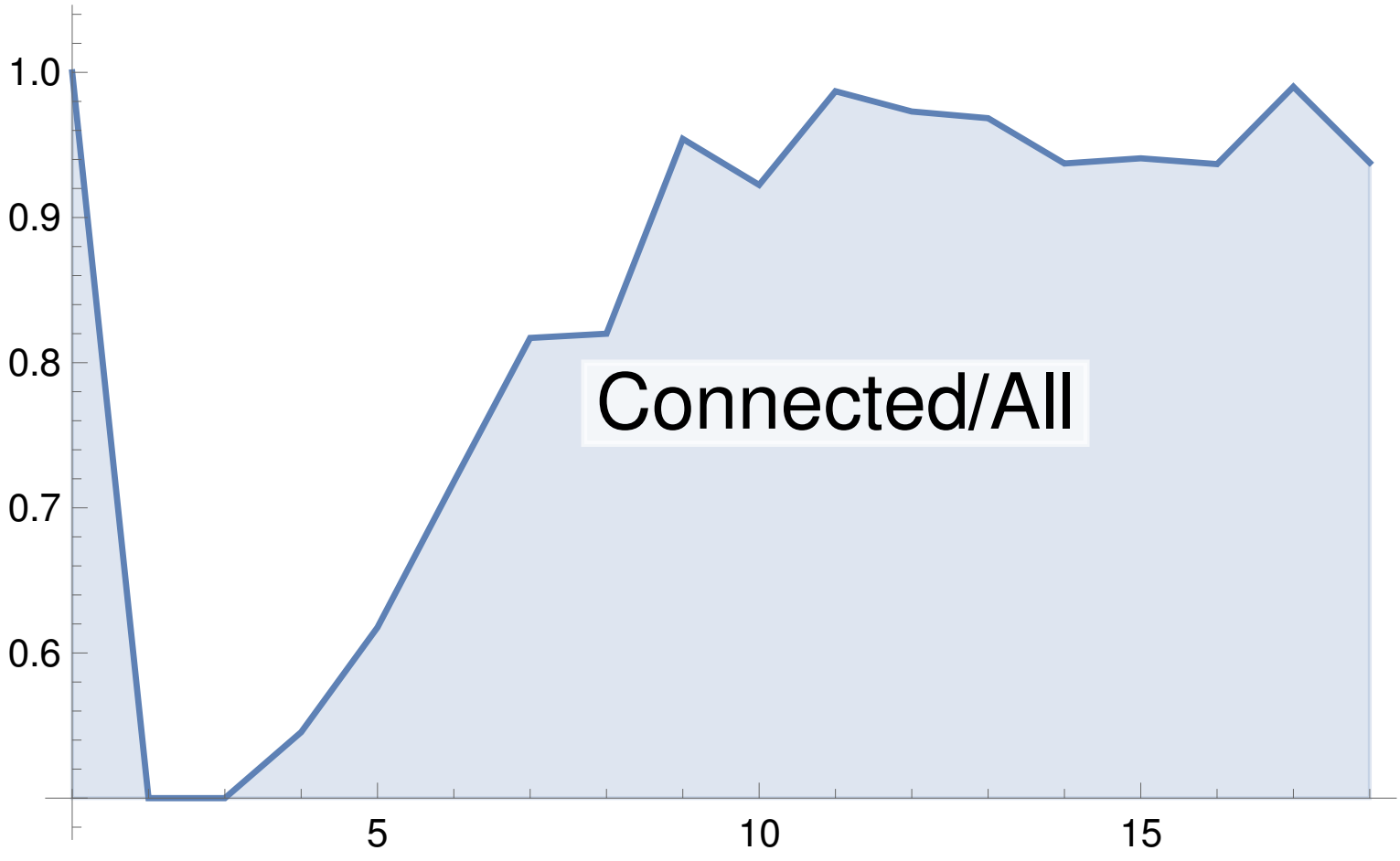
What is...true for almost all graphs?

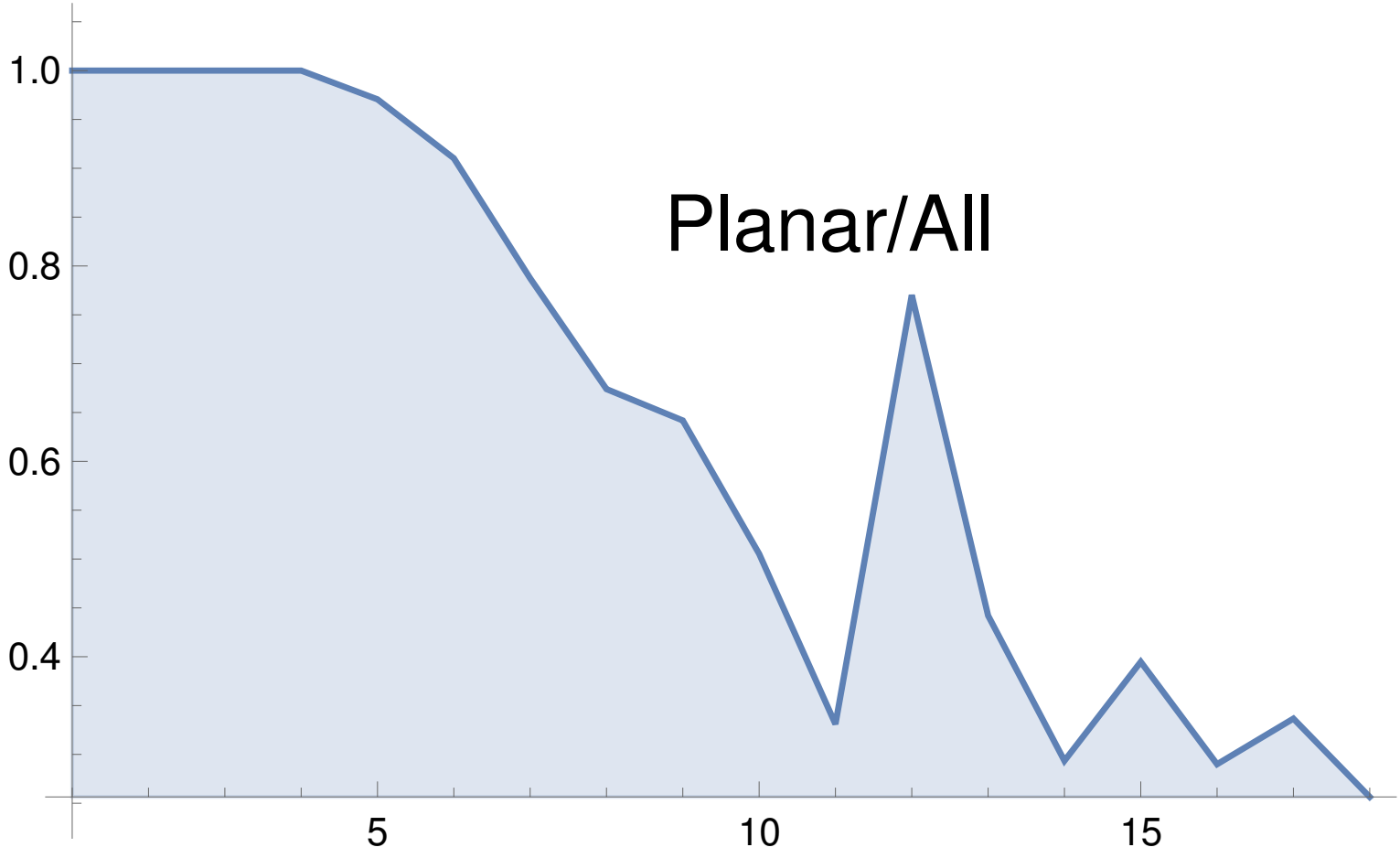
Or: Many, many edges...

Many edges - part 1



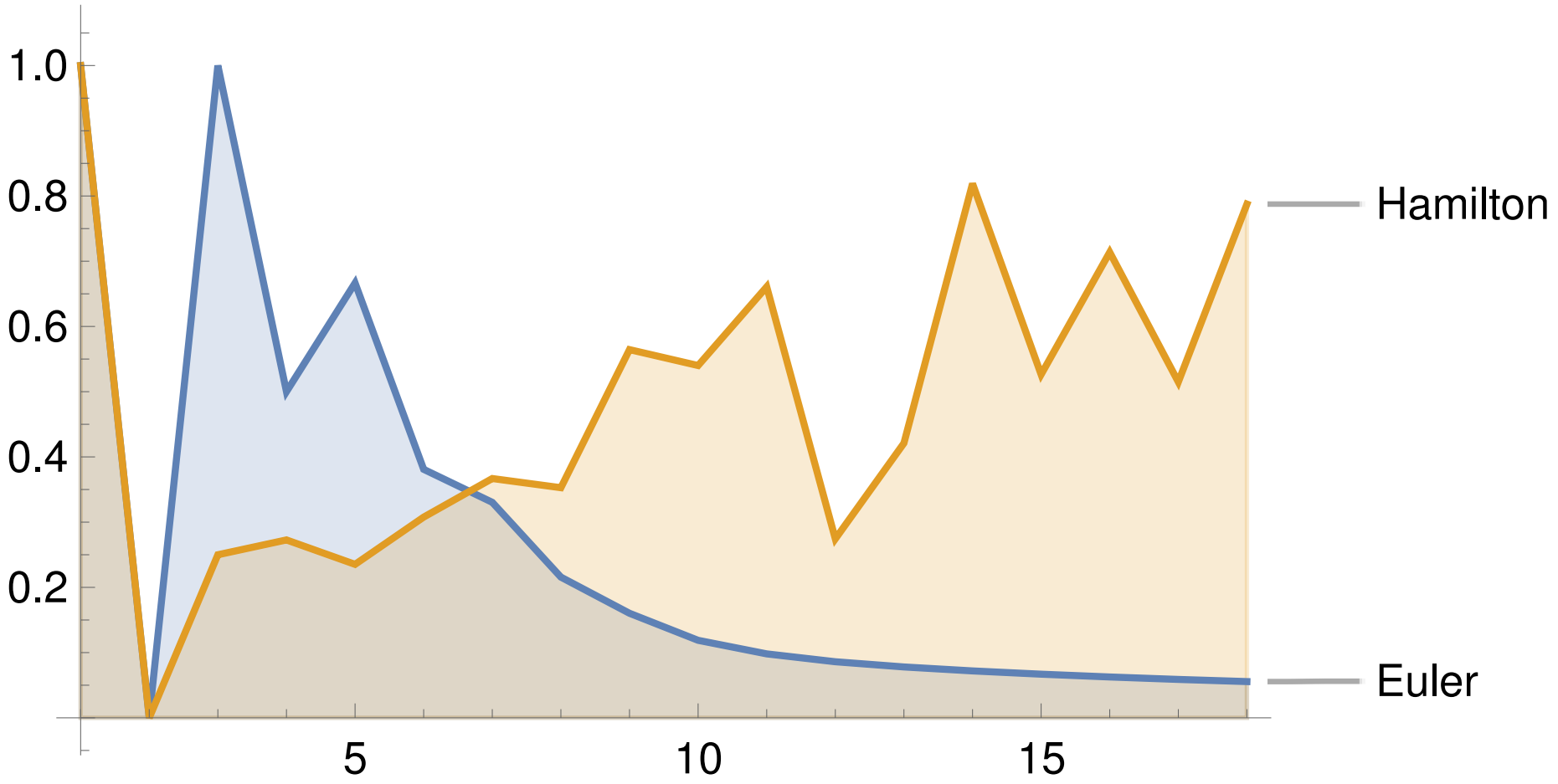
- Recall Most graphs have many edges
- Almost all graphs should be connected
- Above # connected graphs / # all graphs

Many edges - part 2



- Recall Most graphs have many edges
- Almost no graph should be planar
- Above # planar graphs / # all graphs

Many edges - part 3



- Recall Most graphs have many edges
- Almost all graphs should be Hamiltonian and almost no graph should be Eulerian
- Above # connected Hamil resp. Euler / # all graphs

For completeness: A formal statement

For constant $0 < p \leq 1$ we have:

- Almost all $G_{n,p}$ are connected
- Almost all $G_{n,p}$ are not planar
- Almost all $G_{n,p}$ are Hamiltonian; almost no $G_{n,p}$ is Eulerian

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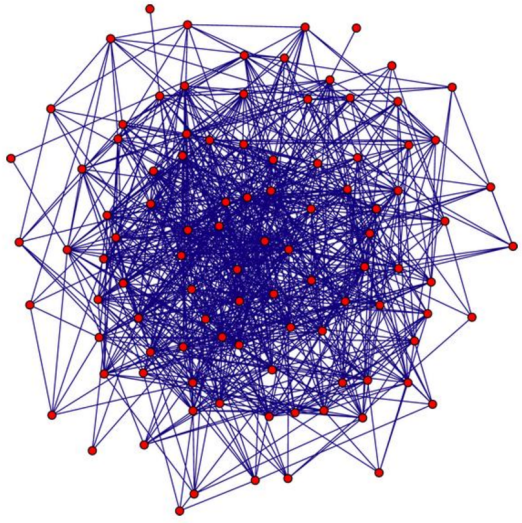
- There are also statements for varying p
- Similarly for essentially all properties that depend on the number of edges

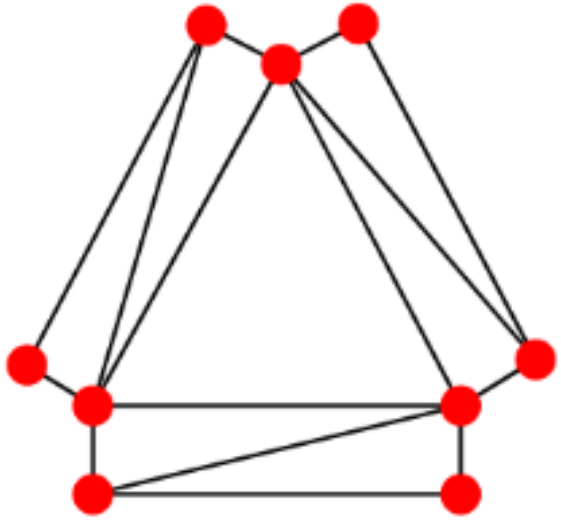


Almost no symmetries

$\lvert\mathrm{Aut}\,(G)\rvert$	OEIS	counts of graphs with 1, 2, ... nodes
1	A003400	0, 0, 0, 0, 0, 8, 152, 3696, 135004, ...
2	A075095	0, 2, 2, 3, 11, 46, 354, 4431, 89004, ...
3		0, 0, 0, 0, 0, 0, 0, 0, 4, ...
4	A075096	0, 0, 0, 2, 6, 36, 248, 2264, 31754, ...
6	A075097	0, 0, 2, 2, 2, 8, 38, 252, 3262, ...
8	A075098	0, 0, 0, 2, 4, 14, 74, 623, 7003, ...

smallest cyclic group graph

$(n = 9, |Aut| = 3)$



- $Aut(G)$ = group of automorphisms of a graph
- Graph automorphisms keep adjacency so random appearing edges are tricky
- Theorem Almost all graphs have trivial automorphism group

Thank you for your attention!

I hope that was of some help.