What is...Fagin's theorem?

Or: Almost always true, almost always false

Simple graphs and their random friends



- Simple graph = a graph without multiple edges or loops
- ▶ Random (simple) graph = for each pair v, w of vertices with $v \neq w$ put an edge with probability $0 \le p \le 1$

Coin toss graphs



► Random graphs in this video are coin toss graphs

• This just means that p = 0.5

Coin toss graphs with many vertices



- ▶ Random graphs are best studied for $n \gg 0$ (n=# vertices)
- ► Some patterns seem to stabilize
- ▶ Note that almost all graphs are very large, *i.e.* $n \gg 0$

A property of first-order logic (fol) holds true either for almost all coin toss graphs or is false for almost all of them Only two options WHY WOULD WELCOME TO SOCIAL OR (2) YOU CAN SHARE SO THOSE ARE THE I MEAN ... THERE ARE ONLY TWO OPTIONS? MEDIA! WHEN YOU PUT PERMANENT COPIES OF ANYONE PICK NUMBERS BETWEEN STUFF HERE, YOU HAVE IT ALL WITH BILLIONS OPTION TWO? THERE'S NOTHING 300 AND A BILLION. TWO OPTIONS: (1) YOU CAN OF PEOPLE, INCLUDING IN RETUFEN? HUH? NAME ONE. TIJO ISTHE MAKE IT AVAILABLE TO A INTERNET SCAMMERS. DEFAULT. I DON'T SMALL SET OF 300 OR RANDOM PREDATORY PRETTY SURE UNDERSTAND. SO APPROVED FRIENDS. YIKES. COMPANIES, AND HOSTILE T WOULD HAVE LIKE WHAT? FOREIGN GOVERNMENTS. HEARD OF THOSE 28 උ ථ ഹ я

▶ I comment on fol graph theory on the next slide

► A bit disappointing : fol graph theory is quite uninteresting

Fol graph theory



- ► Fol graph theory '=' the only adjacency relation and equality, and quantification is only permitted over elements of the graph
- Not fol : "G is connected", "G is bipartite", "G is Hamiltonian", ...
 - Example "G is connected" needs quantifying over paths

Thank you for your attention!

I hope that was of some help.