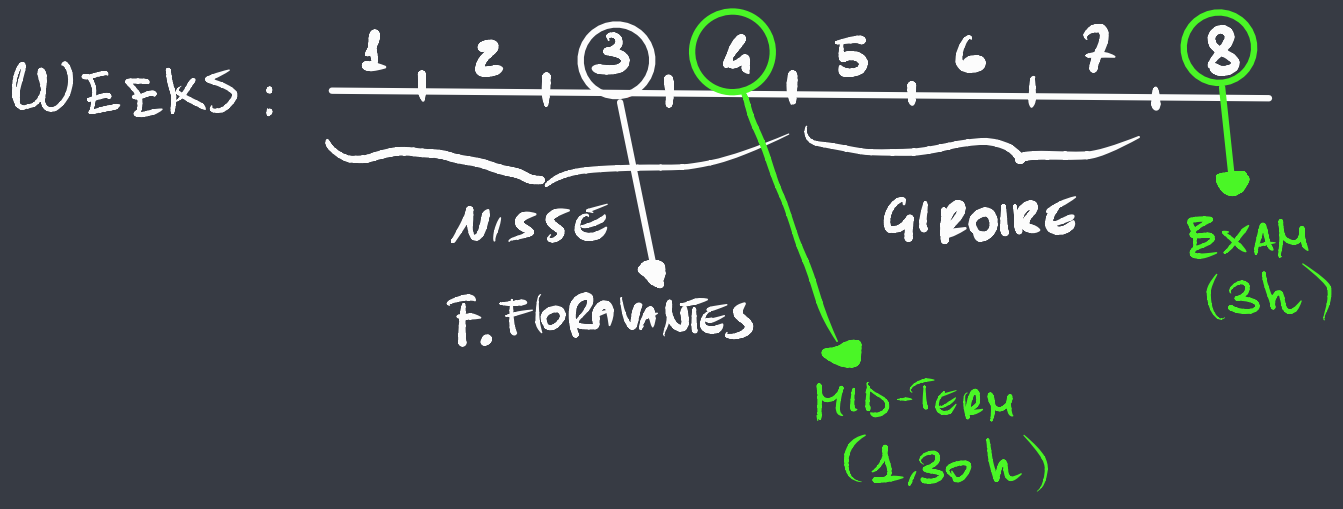
Graph algos & Comb. opt



2021

INTRO TO GRAPHS

TH

- $T=(V,E)$ is a Tree $\Leftrightarrow$ T is CONNECTED and $|V| = |E| + 1$

PROOF ($\Leftarrow$)

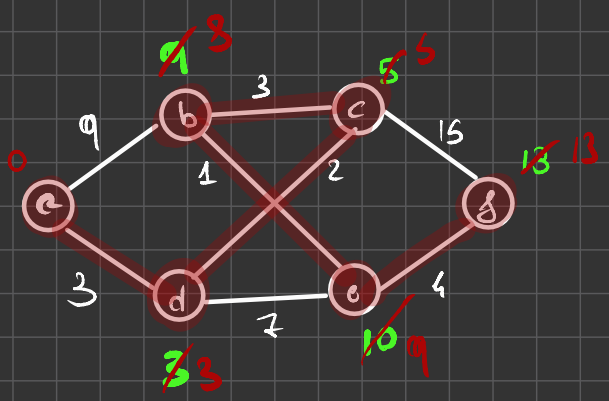
($\Rightarrow$ is TRIVIAL)

- (RIC T is a TREE if CONNECTED and NO CYCLES)
- Suppose T not a tree $\Rightarrow \exists$ cycle $(v_1, \dots, v_g)$
- remove $\{v_1, v_g\} \in E$ obtaining T' (connected)
- $|E'| = |E| - 1 = |V| - 2 = |V'| - 2$
- $|E'| < |V'| - 1 \Rightarrow T'$ NOT CONNECTED ↯

- $G = (V, E)$ is connected if, for every two vertices $x \in V$ and $y \in V$, there exists a path from x to y.

Exercise: Prove that if $|E| < |V| - 1$ then $G = (V, E)$ is NOT connected

	a	b	c	d	e	g
1°	0	∞	∞	∞	∞	∞
2°		9	//	3	//	//
3°		//	5		10	//
4°		8			//	20
5°					9	//
6°	0	8	5	3	9	13



DIJKSTRA