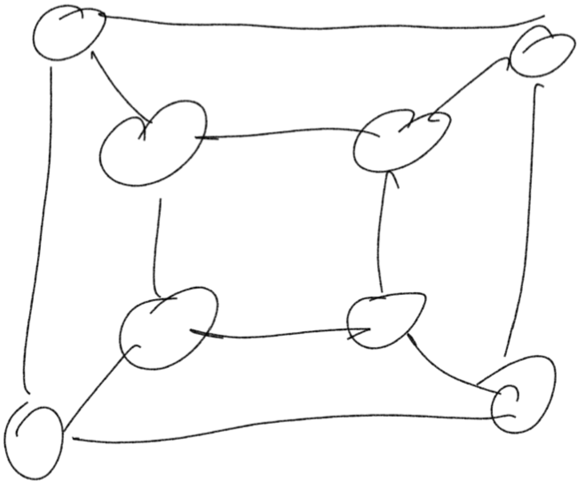
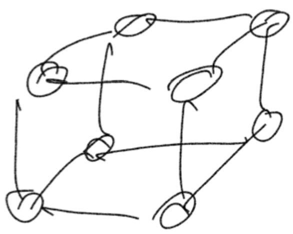
$G = (V, E)$

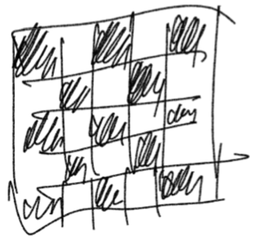
Knoten   Kanten

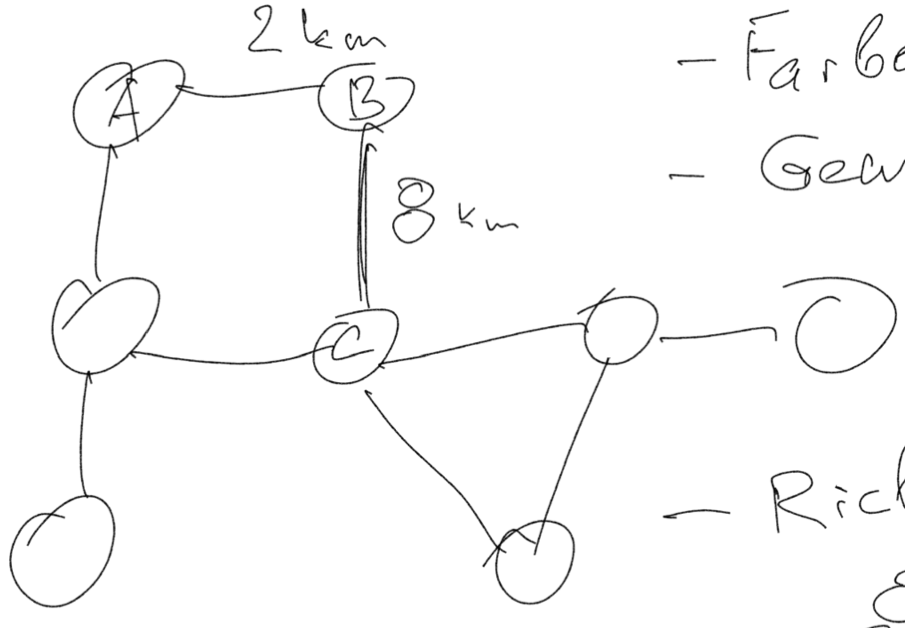
$E = \{(x,y), (y,z), \dots\}$

V   V   V

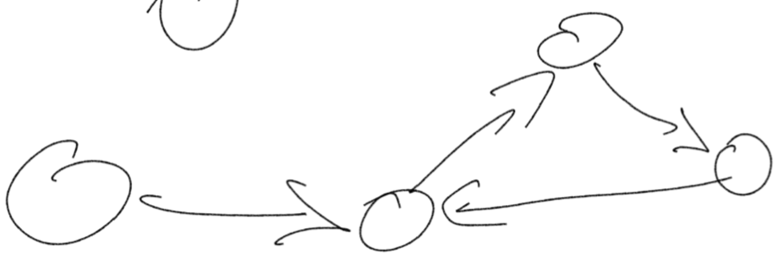


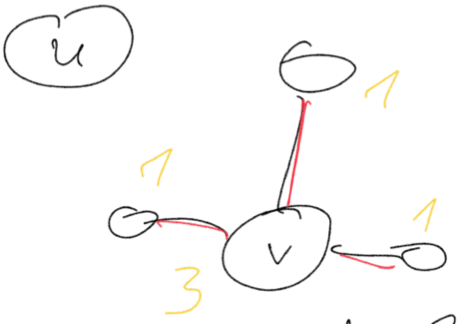






- Farben
- Gewichte
- Richtung





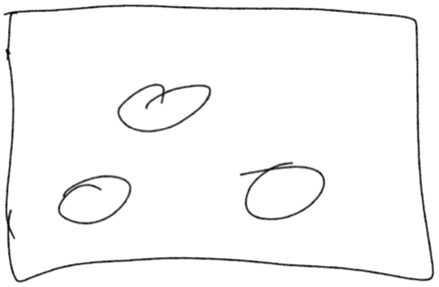
Knoten: (ungerichtet. Graph)

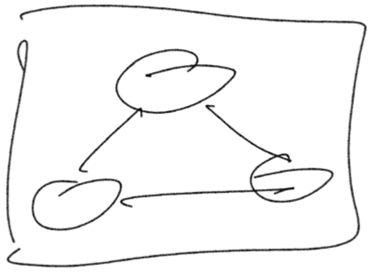
deg(v) = # Kanten an v

deg(v) = 3

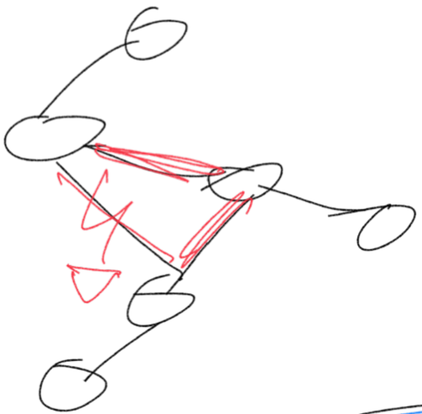
deg(u) = 0

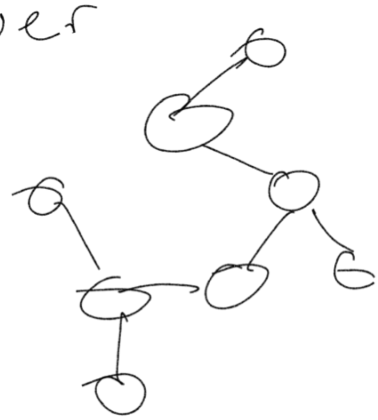
- Zusammenhang

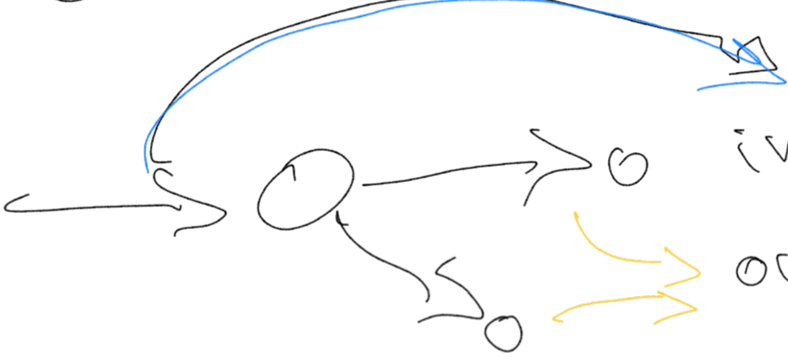




- Baum = kreisfreier zshg. Graph





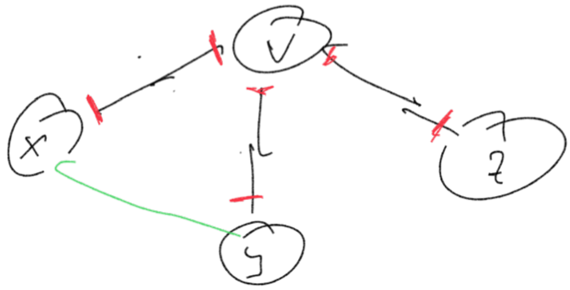


indeg = 1

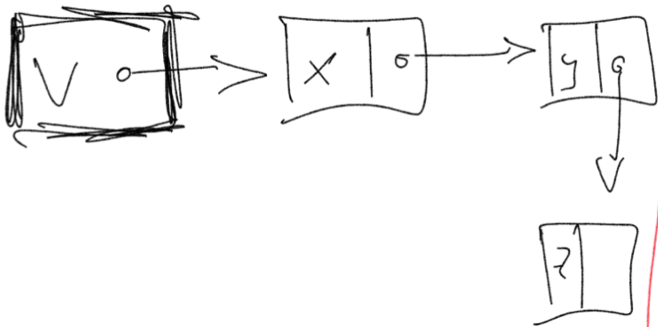
outdeg = 2

- Nachbarschaft eines Knotens v

$Adj(v) = \{x, y, z\}$



- Liste (von v:)
- Matrix



$V_{new} = \underline{V_{old}} \cup \{u\}$

for v in $\underline{V}$ do:

. . . .

$\cancel{V[1]}$

Wichtig!

V, E sind Mengen!

1) $\sum_{v \in V} \deg(v) = 2|E|$ (unger. Graph)

2) # Knoten mit ungeradem Grad ist gerade !

3) $\underline{E \subseteq \binom{V}{2}} \Rightarrow E \in O(V^2)$

(4)) statt $O(|V|)$ darf man $O(V)$ schreiben!

Problem als Graph modellieren

1. Was ist V?

2. $(x,y) \in E \Leftrightarrow \underline{\quad\ldots\ldots\quad}$

3. gerichtet? gewichtet?

wie berechnet man Gewichte?

zB $w((x,y)) = x+y$

4 Gibt es (modifizierten) Algo der mein Problem löst?

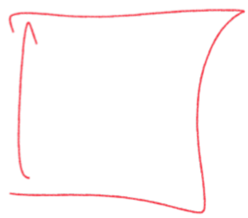
Bsp Schachbrett, Springer

- Knoten sind die Felder
- $(x,y) \in E \iff$ Springer kann in 1. Zug von x nach y

- ungerichtet
- ungewichtet

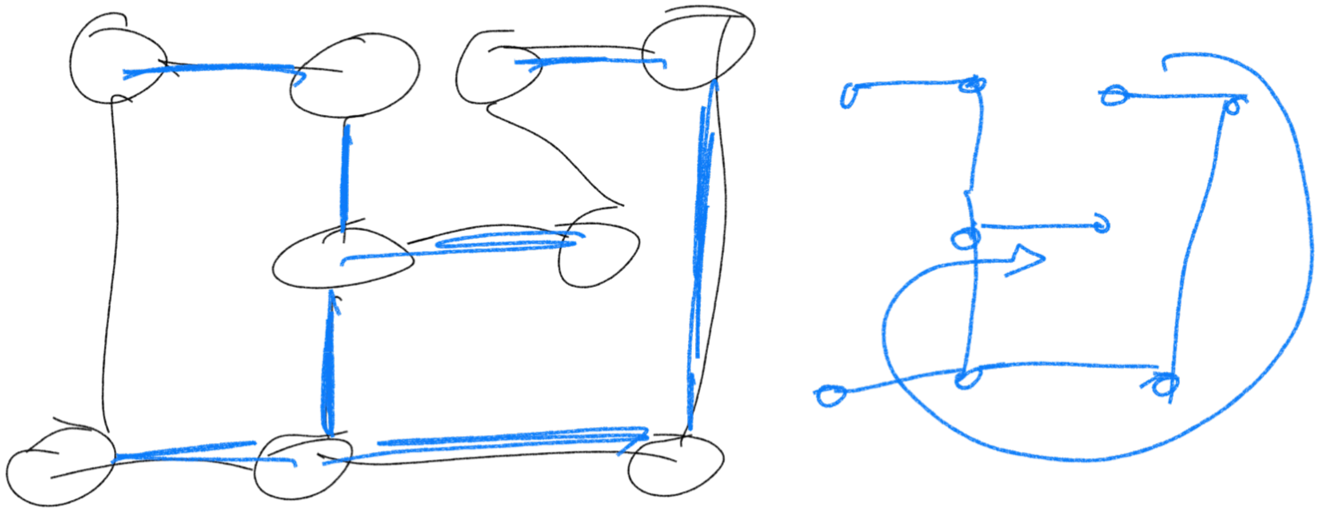
- Wald = kreisfreier Graph
- Baum = zshg. Wald

$V = \{u\}$
$E = \emptyset$



$V = \emptyset$
$E = \emptyset$

wird von Stoff in ADS ausgeschlossen



- Spannbaum - "spannt" G auf

$V_{SB} = V_G$, $E_{SB} \subseteq E_G$

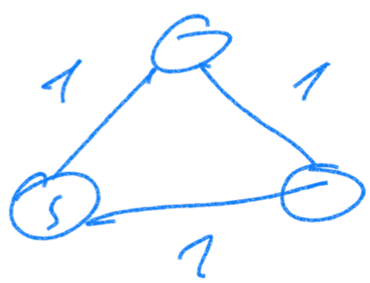
$E_{SB} = E_G$

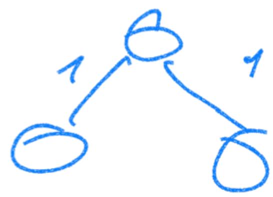
Min. SB (MST) (MSB)

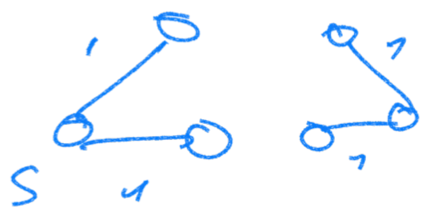
- G gewichtet (sonst: $w(e)=1$)

- MST_G: ein SB, wo gilt

$$\sum_{e \in E_{MST}} w(e) \text{ ist minimal}$$



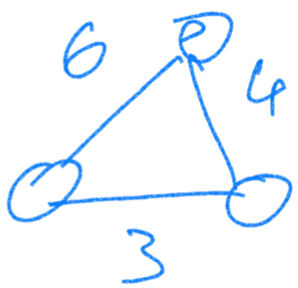


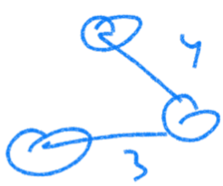


(K_3)

BFS-Baum ist von s abhängig

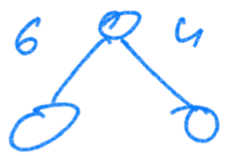
MST hat keinen Start-knoten





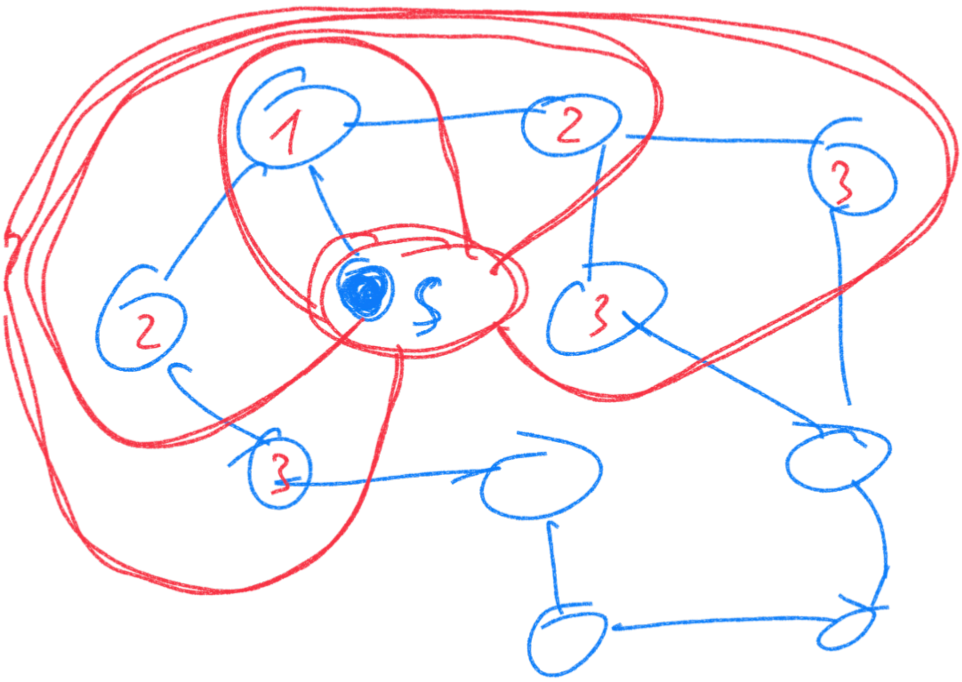
MST

$\to 7$



BFS-Baum

$\to 10$

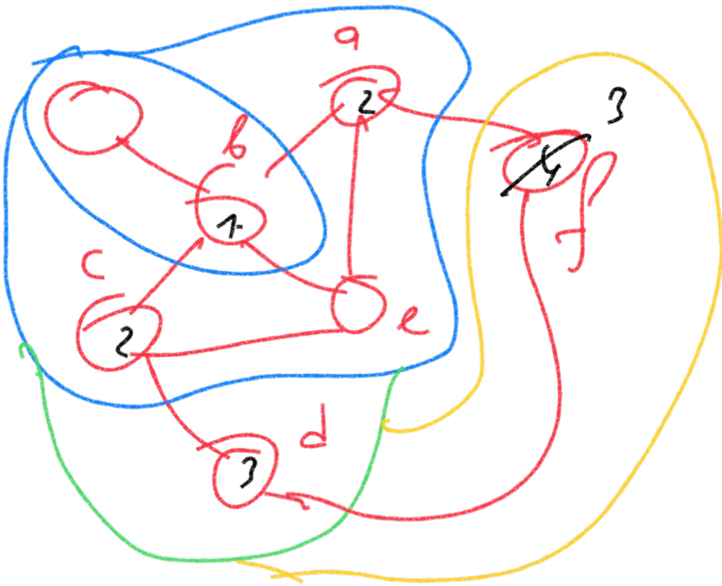


- BFS / Breitensuche
- DFS / Tiefensuche

von einem Knoten aus den ganzen Graphen besuchen

BFS: <u>wellenförmig</u>

kürzeste Wege in G falls G <u>ungewichtet</u>

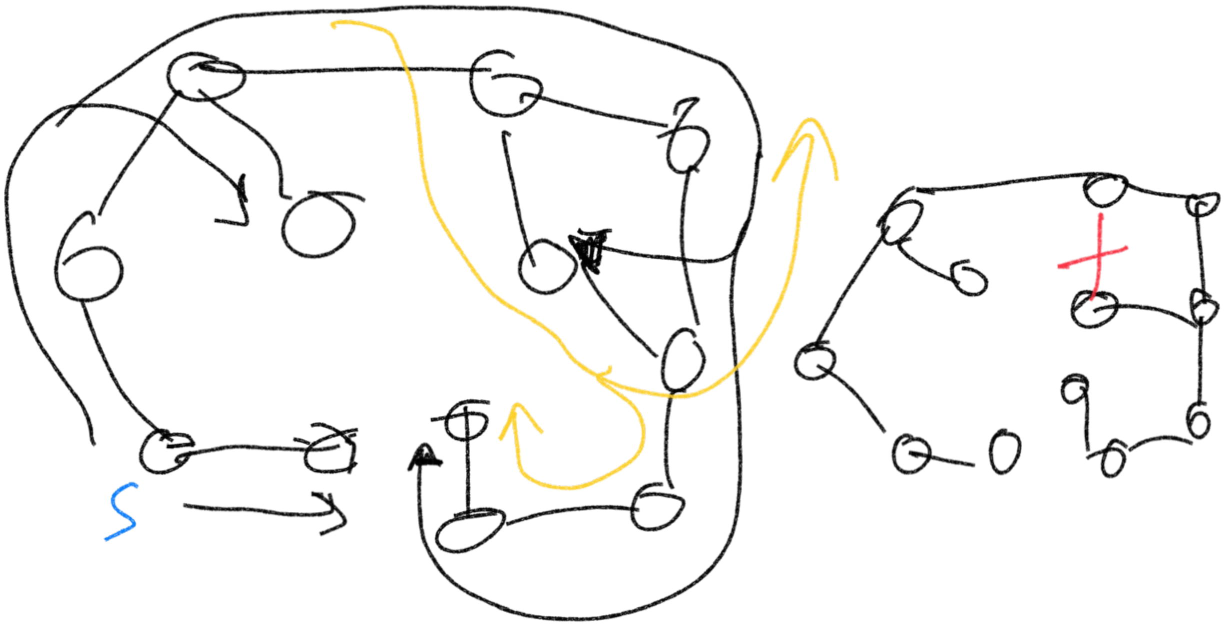


Queue:

b

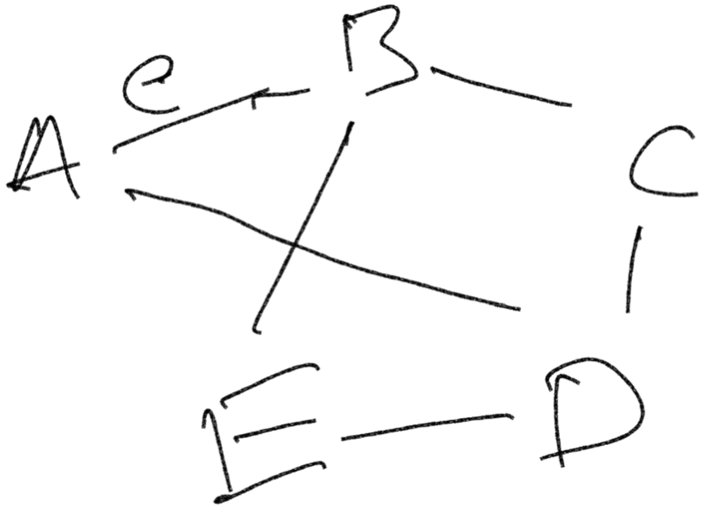
FIFO

d a e c



topol. Sortierung

- G gerichtet
- $(x,y) \neq (y,x)$
- $(x,y) \in E \Rightarrow$ "finde" x vor y
- häng besuchte Knoten vorne an Liste an.
- Liste ergibt top. Sort.



ger. $e = (A, B)$

unger. $e = \{A, B\} = \{B, A\}$