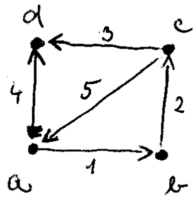
POČET KOSTER

orientovaný graf



hrana č. 1 vychází z vrcholu a

	1	2	3	4	5
a	-1	0	0	-1	0
b	0	-1	0	0	0
c	0	0	-1	0	-1
~~d~~	~~0~~	~~0~~	~~0~~	~~0~~	~~0~~

$\det\left(M_R(G)\cdot M_R(G)^T\right)$ = počet koster

- v orient. grafu vyškrtnu poslední řádek

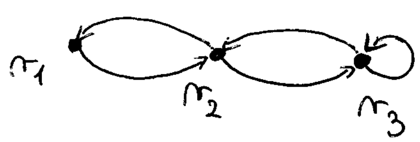
$$\underbrace{\begin{bmatrix} -1 & 0 & 0 & -1 & 0 \\ 0 & -1 & 0 & 0 & 0 \\ 0 & 0 & -1 & 0 & -1 \end{bmatrix}}_{M_R(G)} \cdot \underbrace{\begin{bmatrix} -1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & -1 \\ -1 & 0 & 0 \\ 0 & 0 & -1 \end{bmatrix}}_{M_R(G)^T} = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 2 \end{bmatrix} \dots \det\begin{vmatrix} 2 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 2 \end{vmatrix} = 4$$

počet koster

neorientovaný graf

- matice: na diagonále → počet hran vycházejících z vrcholu
 \+ kam hrana míří, tam (-1)
- škrtám poslední řádek i sloupec ⇒ determinant = počet koster

SLEDY



$$S(G) = \begin{array}{c} \\ \\ \end{array}\begin{array}{ccc} v_1 & v_2 & v_3 \end{array}$$
$$S(G) = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 1 \end{bmatrix}\begin{matrix} v_1 \\ v_2 \\ v_3 \end{matrix}$$

- délka sledu určuje mocninu matice

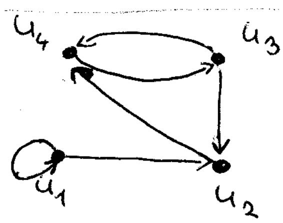
PŘ: sled délky 3

$$S(G)\cdot S(G)\cdot S(G) = \begin{bmatrix} 0 & 2 & 1 \\ 2 & 1 & 3 \\ 1 & 3 & 3 \end{bmatrix}$$

počet sledů délky 3 z vrcholu v_2 do v_3

DISTANČNÍ MATICE

- z matice sousednosti S(G)
- umocníme na $N-1=3$



$$S(G)^1 = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

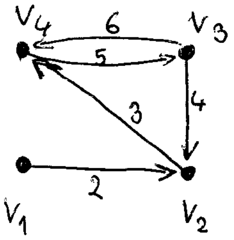
$$S(G)^2 = S(G)^1\cdot S(G)^1 = \begin{bmatrix} \cancel{1} & \cancel{1} & 0 & 1 \\ 0 & \cancel{0} & 1 & \cancel{0} \\ 0 & \cancel{0} & \cancel{1} & \cancel{1} \\ 0 & 1 & \cancel{0} & \cancel{1} \end{bmatrix}$$

$$S(G)^0 = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$$

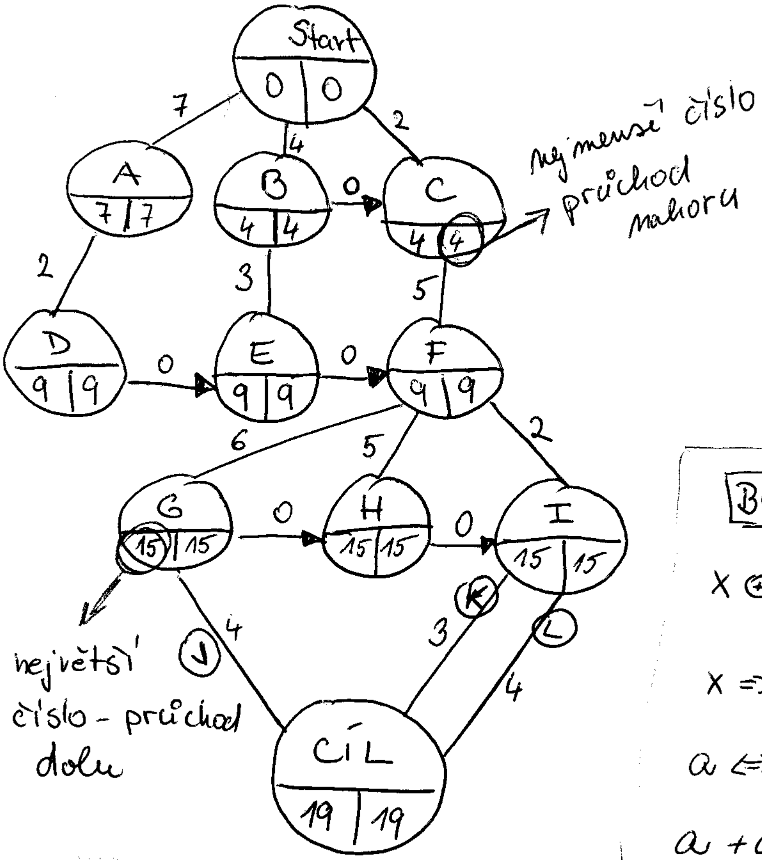
$$S(G)^3 = S(G)^2\cdot S(G)^1 = \begin{bmatrix} \cancel{1} & \cancel{1} & 1 & \cancel{1} \\ 0 & \cancel{1} & \cancel{0} & \cancel{1} \\ 0 & 1 & 1 & \cancel{1} \\ 0 & \cancel{0} & 1 & \cancel{1} \end{bmatrix}$$

$$D(G) = \begin{bmatrix} 0 & 1 & 3 & 2 \\ \infty & 0 & 2 & 1 \\ \infty & 1 & 0 & 1 \\ \infty & 2 & 1 & 0 \end{bmatrix}$$

MATICE VZDÁLENOSTI



$$
\begin{array}{c|cccc}
 & v_1 & v_2 & v_3 & v_4 \\
\hline
v_1 & 0 & 2 & 0 & 0 \\
v_2 & 0 & 0 & 0 & 3 \\
v_3 & 0 & 4 & 0 & 6 \\
v_4 & 0 & 0 & 5 & 0
\end{array}
$$



KRITICKÁ CESTA

činnost	doba	podmínka
A	7	–
B	4	–
C	2	–
D	2	A
E	3	B
F	5	B C
G	6	D E F
H	5	E F
I	2	E F
J	4	G
K	3	G H I
L	4	I

BOOLEOVSKÁ FORMULE

$$x \oplus y = x \cdot \bar{y} + \bar{x} \cdot y = (x+y) \cdot (\bar{x}+\bar{y})$$

$$x \Rightarrow y = \bar{x} + y$$

$$a \Leftrightarrow b = (a \Rightarrow b) \wedge (b \Rightarrow a)$$

$$a + a \cdot b = a$$

$$x \cdot \bar{x} = 0 \qquad \bar{\bar{a}} = a \qquad x \wedge y = x \cdot y$$

$$x + \bar{x} = 1 \qquad \bar{x} \cdot \bar{x} = \bar{x} \qquad \& = \bullet \text{ (krát)}$$

$$x + x = x \qquad x \vee y = x + y$$

ÚPLNÝ DISJUNKTIVNÍ TVAR:
(SOUČTOVÝ) – $(A \cdot B \cdot C) + (A \cdot \bar{B} \cdot C) \ldots$

ÚPLNÝ KONJUNKTIVNÍ TVAR
(SOUČINOVÝ) – $(A + B + C) \cdot (A + \bar{B} + C)$

$\boxed{2^{100} \bmod 13}$

$2^1 \equiv 2 \mod 13$

$2^4 \equiv 16 \equiv 3 \mod 13$

$2^6 \equiv 64 \equiv 12 \equiv -1 \mod 13$

$(2^6)^{16} = 2^{96}$

$2^{100} = 2^{96} \cdot 2^4 = (-1)^{96} \cdot 3 = 3$

zbytek po dělení je 3.

$$\boxed{\overline{\bar{A} \vee (B\&C)} \Rightarrow (A \Leftrightarrow (B \vee C))} = \bar{A} + BC + \left(A \Rightarrow (B+C) \cdot (B+C) \Rightarrow A\right) =$$

$$= \bar{A} + BC + (\bar{A} + B + C)\cdot(\bar{B}\bar{C} + A) = \bar{A} + BC + \bar{A}\bar{B}\bar{C} + \cancel{B\bar{B}\bar{C}} + \cancel{\bar{B}C\bar{C}} + \cancel{A\bar{A}} +$$

$$+ AB + AC = \bar{A} + BC + \bar{A}\bar{B}\bar{C} + AB + AC =$$

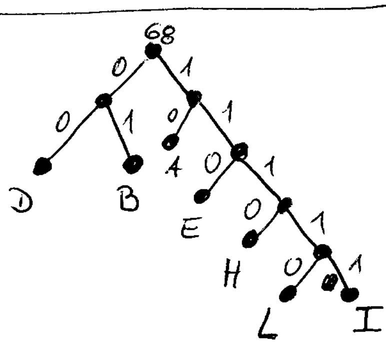
$$= \bar{A}(B+\bar{B})(C+\bar{C}) + (A+\bar{A})BC + \bar{A}\bar{B}\bar{C} + AB(C+\bar{C}) + A(B+\bar{B})C =$$

$$= \bar{A}BC + \bar{A}B\bar{C} + \bar{A}\bar{B}C + \bar{A}\bar{B}\bar{C} + ABC + \cancel{\bar{A}BC} + \cancel{\bar{A}\bar{B}\bar{C}} + \cancel{ABC} + AB\bar{C} + \cancel{ABC} + A\bar{B}C$$

$$= \underline{\bar{A}BC} + \underline{\bar{A}B\bar{C}} + \underline{\bar{A}\bar{B}C} + \underline{\bar{A}\bar{B}\bar{C}} + \underline{ABC} + \underline{AB\bar{C}} + \underline{A\bar{B}C}$$

HUFFMANŮV KÓD

A	B	D	E	H	I	L
18	15	13	10	5	3	2

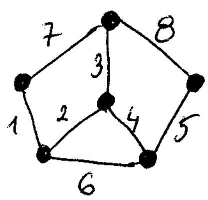


A – 10
B – 01
D – 00
E – 110
H – 1110
I – 11111
L – 11110

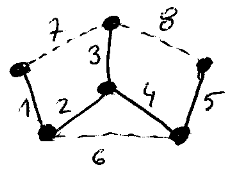
BALL = 0110 11110 11110

váha $= 2\cdot 18 + 2\cdot 15 + 2\cdot 13 + 3\cdot 10 + 4\cdot 5 + 5\cdot 3 + 5\cdot 2 = \underline{\underline{167}}$

KRUŽNICE, ŘEZY



kostra →



$$\left.\begin{aligned} C_6 &= [0101\,0100]^T \\ C_7 &= [1110\,0010]^T \\ C_8 &= [0011\,1001]^T \end{aligned}\right\} hod(k_F) = 3$$

$$\left.\begin{aligned} R_1 &= [1\,0\,0\,0\,0\,0\,1\,0]^T \\ R_2 &= [0\,1\,0\,0\,0\,1\,1\,0]^T \\ R_3 &= [0\,0\,1\,0\,0\,0\,1\,1]^T \\ R_4 &= [0\,0\,0\,1\,0\,1\,0\,1]^T \\ R_5 &= [0\,0\,0\,0\,1\,0\,0\,1]^T \end{aligned}\right\} hod(\varphi_F) = 5$$

Lin. kombinací fund. kružnic lze získat libovolnou kružnici v grafu, musíme počítat mod Z_2! (Obdobně u řezů)

$C_1 + C_2 + C_3 \rightarrow$ kružnice, ale není minimální